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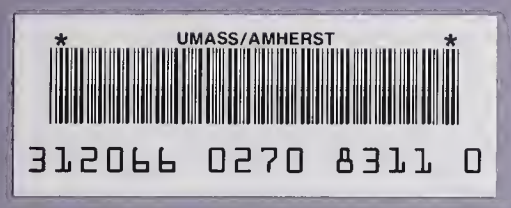

TRANSFER STATIONS

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Bureau of Solid Waste Disposal

Department of Environmental Quality Engineering

Commonwealth of Massachusetts

Transfer Stations:
A Guide for Massachusetts Municipalities

Department of Environmental Quality Engineering
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INTRODUCTION

There is a significant trend in the disposal of solid waste in Massachusetts today. Local landfills across the Commonwealth are closing, and their place is being taken by regional disposal facilities: resource recovery plants, regional landfills, and regional recycling and composting facilities. Of the 195 local landfills currently open, only 40 are expected to be open in 1990. As a result, solid waste will have to be transported over increasingly long distances--beyond a community's boundaries--to final disposal sites.

This situation has led to the building of transfer stations, facilities which accept solid waste from collection vehicles, compacts the waste and transfers that waste into larger transfer haul vehicles for transportation to the final disposal site. The rationale for the transfer station is simple: it means that fewer long trips, using vehicles designed for hauling rather than collection, are required to transport a given amount of waste to the final disposal site. This results in significant haul cost savings.

Many communities will be faced with a choice: either haul their waste to the final disposal site in the vehicles in which it was collected, or construct a transfer station for the reasons cited above.

This report is intended to give municipal officials information which can be useful in their future solid waste planning. Issues covered include: planning, developing, financing, building, equipping, and operating of transfer stations, as well the environmental review process. Each article was written by a professional with experience in the subject area.

The first three articles are case studies of three communities, Holden, Worcester and Southborough, which faced different transfer station decisions. The authors, Lawrence H. Galkowski, Civil Engineer for the town of Holden, Richard Schnorf, Resource Recovery Director for the city of Worcester, and John Boland, Superintendent of Streets for the Town of Southborough, were directly responsible for developing a solid waste disposal system for their communities. All three communities were faced with the closure of their local landfill, and the need to find a new disposal solution.

Their articles cover planning, development and operational issues. Mr. Galkowski explains how he and his solid waste committee evaluated various disposal options, and outlines the criteria--haul costs, tipping fees (the per-ton price paid for each ton of waste disposed of), vehicle trips, seasonal variation in waste generation, and the committee's eventual presentation of its choice to the Holden Board of Selectmen. Mr. Schnorf faced a different situation: the Worcester transfer station had to serve not only the needs of a large city, but also of several

surrounding communities. He also had to deal with the the closure of the Worcester landfill and the construction of the Millbury resource recovery plant, which will open in 1988. Mr. Boland discusses Southborough's situation, which resulted in the building of a transfer station, and covers several features of the Southborough Transfer Station's design and operation.

Environmental review is an integral part of the planning process. Allen Dussault of the Department of Environmental Quality Engineering (DEQE), which handles the environmental regulation of all solid waste facilities including transfer stations, covers the key stages of the environmental review process and the laws and regulations involved.

There are several types of transfer stations and equipment options, and they are covered in two articles by Anthony Zuena of S.E.A. Consultants and Barry Hager of Metal Marketing Solid Waste Equipment. Their articles cover such issues as capital costs, operating costs, manpower requirements, and equipment needs for various sizes and types of transfer stations. Both articles include informative technical drawings.

Financing issues are extremely important to the development of transfer stations. Edward Dlott of the Bank of Boston examines the financing and ownership options available to communities. The article examines the questions of public or private ownership, and long-term versus short-term financing.

A list of transfer stations in Massachusetts, compiled by Manuel Alcantara of the Bureau of Solid Waste Disposal, is also included. The list includes location, size, operator, waste destinations, environmental review status, and a short project description.

Two important factors in evaluating transfer stations, size determination and hauling costs to the final disposal site, are examined in an appendix by John McMichael of the Bureau of Solid Disposal. The article uses specific data taken from consultants' reports prepared for the Bureau.

Further information on transfer stations and other solid waste issues can be obtained from the Bureau of Solid Waste Disposal. Phone: (617) 727-6268.

DEVELOPING A SOLID WASTE DISPOSAL ALTERNATIVE HOLDEN, MASSACHUSETTS

Lawrence H. Galkowski
Civil Engineer II
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Holden, MA

Like many communities in Massachusetts, the Town of Holden has found itself in the position of developing a disposal alternative to its present landfill. Due to various environmental concerns which had been discovered during the construction of Interstate I-190, the Environmental Protection Agency (EPA) and the Department of Environmental Quality Engineering (DEQE) joined efforts to investigate and assess the extent of groundwater contamination which was believed to originate from the Holden landfill. The result of their evaluation was an order from DEQE to cease landfilling and close out operations by August 1, 1986. This had given the Town a deadline for finding a solution.

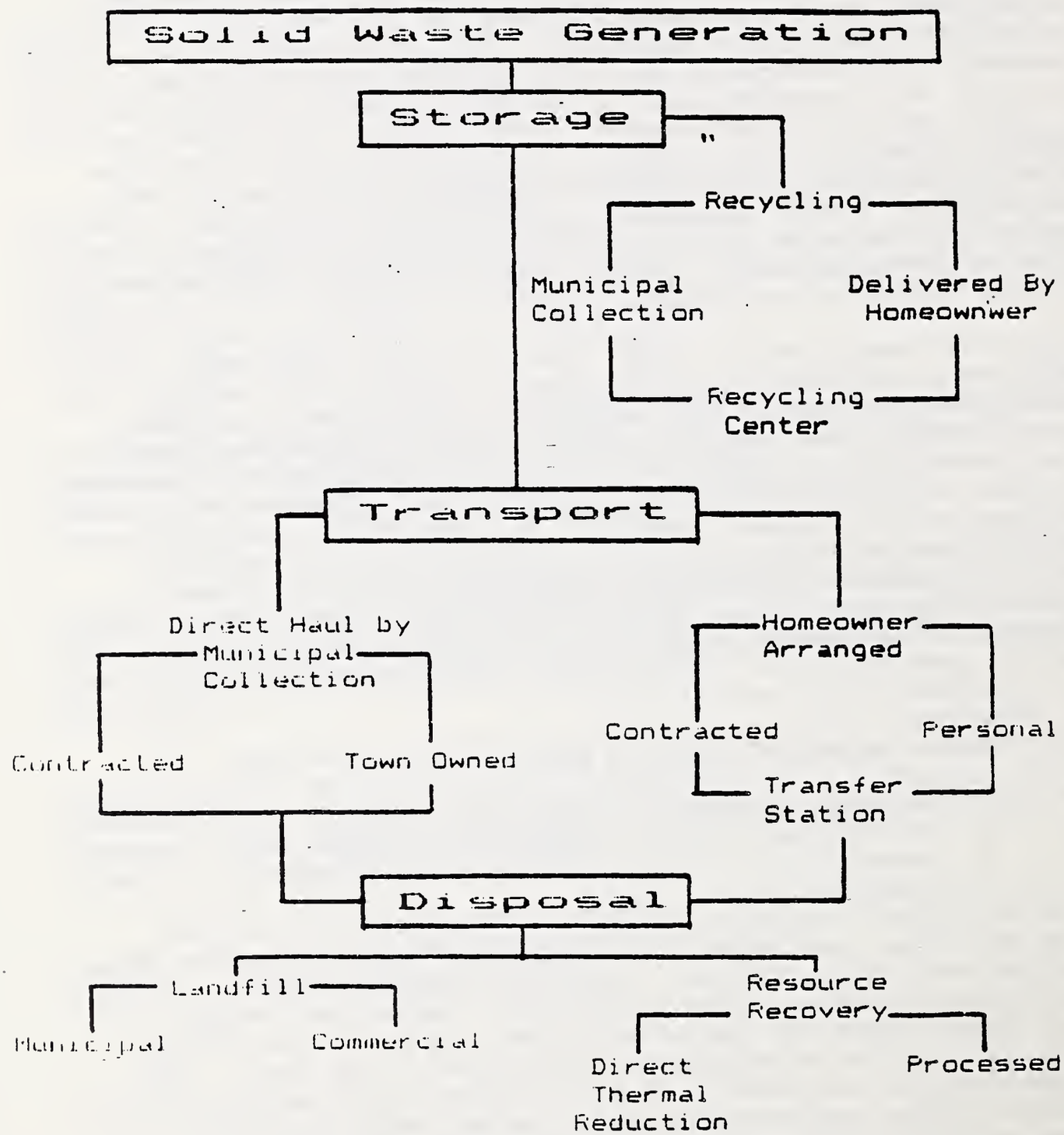
Prior to receiving the DEQE order, the Town had begun planning what direction it would take to replace the landfill, as it was nearing the end of its capacity. In September of 1981, the Board of Selectmen hosted a public informational hearing to educate the citizenry about the technologies available to process and dispose of the never-ending stream of municipal solid waste. An overview of the current landfill life and condition was presented, together with information related to the available disposal technologies, by various representatives of state, regional and local planning agencies and departments. After the presentations were made, those in attendance were asked to complete a questionnaire, ranking the various options from "highly desirable" to "undesirable."

The "most desirable" options were:

a) Regional resource recovery in central Massachusetts
b) Developing another landfill in Holden
c) Developing a resource recovery facility in Holden

The Selectmen concluded that because of the complexity of the options available, further study was necessary, and established a citizens' study committee. The Holden Refuse Disposal Study Committee was established and began its two-year study of the various alternatives available to the Town. The Committee's first task was to develop a working sense of what the solid waste cycle was about and what phases were included. As the Town staff person assigned to assist the Committee, I developed the following chart from which various paths could be explored to achieve the ultimate result of the disposal of municipal solid waste. The major phases of generation, storage, transport, and disposal relevant to each disposal method were considered. As the Committee began examining each possible "route" the elimination of several options was almost immediate.

Solid Waste Disposal Process



Options which would include an additional process, such as shredding or bailing the waste, were eliminated due to the added costs associated with processing. Another strike against an additional process was the fact that these processes would not reduce the weight of the waste but rather they would only reduce the volume, and disposal costs are determined by weight.

The initial thought was to develop another landfill in Town, continuing the accepted practice of the last 15 years. However, with the costs of developing environmentally sound landfills estimated at between $75,000 and $100,000 per acre and the possibility of the state's promulgating new regulations governing the development of landfills in Class "A" watershed areas (which characterizes 90% of Holden) the Committee began seeking other alternatives.

The Committee explored other avenues outlined on the preceding chart, including municipal collection, commercial landfills and modular resource recovery plants. They were evaluated first on local acceptance and implementation and then on economics. After contacting representatives from various companies such as equipment manufacturers, waste haulers, transfer station operators and managers of commercial landfills, sufficient information was collected to develop cost estimates for the various alternatives.

The Town's engineering staff compiled all the information and developed the following table showing those options which were felt to be feasible. As can be seen from the table, the most economic disposal option for the Town was a combination of a municipally owned and operated transfer station utilizing open-top transfer trailers with disposal at the Millbury RESCO resource recovery facility. As all of these costs are considerably higher than the present operating budget of the landfill ($67,355) it was important to develop a simple means of costing to which the citizens could relate. The typical "green trash bag" was chosen and costs per "bag" were calculated.

It was first determined that the average number of persons per household was 3.21 (population/number of dwelling units) and that the amount of waste generated per person is 2.75 pounds per day (0.5 tons/person/year). Next, the following assumptions were made: the weight of uncompacted municipal refuse is 200 lbs/cubic yard and the average household disposes of four trash bags full of refuse per week, therefore resulting in a weight of 15.4 pounds per bag or 0.0077 tons/bag. With this information we were able to translate the cost per ton into cost per bag, a more easily recognizable figure.

To aid the Selectmen in the decision on which option would best serve the Town's needs, the following "Refuse Disposal Shopping List" was developed. This list is divided into three sections namely: Collection, Transport/Haul and Disposal Facility. By selecting one item from each category, various combinations could be derived. This proved to be a valuable means of communicating costs to the general public.

REFUSE DISPOSAL SHOPPING LIST

1. Collection

a. Municipal transfer station	$15.50/ton ($0.12/bag)
b. Curbside Collection	$18.33/ton ($0.14/bag)

2. Transport/Haul

a. Leominster	$ 5.00/ton (0.04/bag)
b. Plainville	$13.50/ton (0.10/bag)
c. Haverhill	$ 9.25/ton ($0.07/bag)
d. Millbury	$ 2.02/ton ($0.02/bag)
e. Curbside Collection (Private)	$ 9.26/ton ($0.07/bag)

3. Disposal Facility

a. Leominster (100% CPI)	$23.85/ton ($0.18/bag)
b. Plainville (100% CPI)	$22.00/ton ($0.17/bag)
c. Haverhill (100% CPI)	$35.00/ton ($0.27/bag)
d. Millbury (50% CPI)	$23.50/ton ($0.18/bag)
e. Curbside Collection (100%)	$30.56/ton ($0.24/bag)

TABLE 1 - SUMMARY OF COSTS PER TON OF FEASIBLE OPTIONS

Facility	Type	Haul Cost	Tip Fee	Total Disposal Cost	Transfer Cost	Collection Cost	Annual Cost
Laidlaw Waste Systems Plainville, MA.	Landfill	$13.44	$22.00	$35.44			$244,748.64
Millbury RESCO Millbury, MA.	Res.Rec.	$2.02	$23.50	$25.52			$176,241.12
Refusetech No. Andover, MA.	Res.Rec.	$10.08	$50.00	$60.08			$414,912.48
Refuse Fuels, Inc. Haverhill MA.	Res.Rec.	$9.24	$35.00	$44.24			$305,521.44
Vicon (Pittsfield) Pittsfield,MA.	Res.Rec.	$18.48	$15.00	$33.48			$231,212.88
Open Top Trailer Holden, MA.	Trans.Sta.				$10.79		$74,515.74
Compactor Sta. Holden, MA.	Trans.Sta.				$11.29		$77,968.74
Municipal Collection (Town Operated	Muni.Coll.					$19.07	$131,697.42
Municipal Collection (Private Contr)	Muni. Coll.					$21.80	$150,550.80

November 1984

After a long hard look at the options, the Holden Refuse Disposal Study Committee made the recommendation that the Town develop a transfer station at the site of the existing landfill and contract for disposal at the Millbury RESCO resource recovery facility. The Committee had agreed that this was the "best option at this time" (December 1984). The Board of Selectmen then reviewed all the information presented to them and agreed that the Town request proposals for the design of a transfer station to meet the Town's needs.

The Town has since contracted with a consulting firm to develop plans and specifications for the construction of a transfer station. Planning the facility has not been an easy task because of the political decisions which must be made prior to commencing design.

The major issue was whether or not to allow commercial and industrial waste along with residential waste into the transfer station. At present any waste generated in the Town--either by a household or a business--may be disposed of at the landfill. Originally, a decision was made to eliminate all commercial and industrial waste and only allow residents to use the facility. However, it was felt that politically it would be in the Town's best interest to accept residential waste collected by those commercial haulers who service residential accounts.

This traffic, together with the cars of those residents who transport their own waste, (the residential daily vehicle count ranges from 200 vehicles per day to 1250 vehicles per day) had significant impact on the facility design. This large daily difference in vehicular traffic is the single most important factor which was considered in the design. It is the Town's intention to provide the residents with an adequate disposal facility without taxing the existing budget and yet not undersize the facility which would cause disposal delays (lines to get into the facility) for residents. The need for expansion in the near future is not anticipated and the proposed design should serve the needs of the Town for the next twenty-plus years.

Anyone interested in more details regarding the various processes through which the Town of Holden has developed its solid waste disposal plan may contact:

Department of Public Works
Engineering Division
1196 Main Street
Holden, Massachusetts 01520
(617) 829-6561

A SOLID WASTE TRANSFER STATION ONE COMMUNITY'S BRIDGE BETWEEN A MUNICIPAL LANDFILL AND RESOURCE RECOVERY

By Richard A. Schnorf
Program Director
Solid Waste Resource Recovery System
Worcester, MA

SOLID WASTE CRISIS

In 1975, when Worcester joined with other Central Massachusetts communities to start planning a long-range, common solution to the problem of disposal of solid waste, an orderly transition from landfilling to resource recovery was expected. Following the failure of its initial waste-to-energy project in November of 1980 and the decision in July of 1981 by the Department of Environmental Quality Engineering to order closure of Worcester's landfill by June 1, 1985, the city realized that it was facing a crisis and that its chances of going directly from the landfill to a resource recovery facility were dicey.

Compounding the problem was the lack of credibility of the Central Massachusetts resource recovery project caused by the precipitous ending to the initial project. Federal and state solid waste agencies were not convinced that a second attempt at resource recovery would be successful; only limited, conditional support was given to the second project.

In spite of vigorous support by Millbury, which had saved the regional concept by volunteering a site, progress was slow, at times virtually undetectable. By the spring of 1983 after repeated failures to achieve schedule milestones, the project was on the verge of stalling. It was at this point that the Central Massachusetts Resource Recovery Committee (CMRRC) voted to accept an offer from Signal Environmental Systems (then Signal Resco) to enter into sole-source negotiations.

As seen by Worcester's Commissioner of Public Works, F. Worth Landers, one of the strengths of Signal's offer was its willingness to assist the city in finding a solution to bridge the gap between closure of the municipal landfill and opening of the resource recovery plant in Millbury. This willingness was to grow into a corporate commitment to provide an interim disposal system for the city with no profit for Signal.

CONTINGENCY PLANNING

Why didn't Worcester plan to build the station on its own site? In fact, the city's engineering consultant, Metcalf & Eddy, had determined in August of 1983 that it was feasible to convert the old incinerator building into a transfer station. The city's Department of Public Works recommended proceeding to the design stage, but Worcester's City Council--in the face of strong neighborhood opposition to any more disposal sites in that

area of the city--reaffirmed a policy voted in 1980 that said that there would be no new solid waste disposal facilities in the city after closure of the municipal landfill. It is questionable whether or not a station could have been developed at that site even if Council had not taken a position; citizen opposition was so strong that it was clear that an intense, bitter battle would have had to be fought to obtain a site assignment.

PROJECT DEVELOPMENT

On October 11, 1983--well before negotiations were completed for the regional resource recovery plant--representatives from Signal and Worcester spoke with Millbury's Board of Selectmen to determine the board's receptivity to the establishment of a transfer station at the resource recovery site. Following this initial approach, the Central Massachusetts Resource Recovery Committee requested Millbury's Board of Selectmen to approve the concept of a long-term transfer station at the resource recovery site to accept waste which would not be suitable for resource recovery. In mid-January of 1984 Millbury voted to approve the concept of a long-term transfer station, and Signal began to prepare a proposal.

Both Millbury and Worcester appointed representatives to negotiate for the proposed transfer station. Initially these negotiations were planned to be on a community-to-community basis with Worcester's negotiations with Signal to be conducted separately. It became apparent, however, that the negotiations had to be on a three-party basis.

Before considering the issues, it will be helpful to describe Signal's role in the planning, construction, and operation of the transfer station. Signal repeatedly made it clear that it was not in the transfer station business. It was a participant solely because Worcester was <u>in extremis,</u> and the resource recovery facility being negotiated was not going to solve Worcester's short-term need. The company agreed to manage the transfer-station project including using the RFP process to select a designer and an operator. Signal agreed to manage the project without profit to itself, passing through its administrative costs to the city. Although corollary advantages may have developed for Signal, at least during the planning and permitting stages Signal was performing this service solely as an adjunct to the resource recovery negotiations which overlapped some of the transfer station planning.

ISSUES

- Sizing
- Landfill Phaseout (Worcester)
- Site Assignment (Millbury)
- Costs
    - Capital
    - Operating
- Permitting

- o Term and Ownership
- o Construction

The issues are listed roughly in ascending order of difficulty as perceived by Worcester. Not all were negotiating issues. Landfill phaseout, for example, involved only the city. At first glance there may appear to be a sort of chronological order, but none is intended. Ownership, for example, was an issue which surfaced early in negotiations and was not nailed down until late in negotiations.

In April of 1984 Signal explained its approach to the development and operation of the transfer station and presented projected costs. In May Worcester's City Council asked that Signal guarantee that an out-of-city transfer station would be available to the city when the landfill closed in the following year. Signal responded in June with a reaffirmation of its commitment to enable Worcester to close its landfill as scheduled on June 1, 1985, even if resource recovery conditions precedent were not met.

Several months later, Signal's strong statement of support was repeated by Alfred B. DelBello, president of Signal Environmental Systems. Mr. DelBello's assurance was to be a linchpin for the development of the transfer station. Furthermore, it so buttressed the confidence of City Council that even in some of the darker periods which were ahead, Council held steadfastly to Signal's commitment to provide the city with an interim solid-waste solution.

SIZE

At first glance sizing the station appears to be a simple task. The station was to be built principally for the city's short-term use. It is reasonable, then, to size the station to meet Worcester's need. The city, however, controls only about 25% of the waste generated in the city. More than 150,000 tons had been deposited in the municipal landfill in 1984, but how much of that waste would come to the transfer station? In the absence of legislation to control the flow, 75% of the city's waste could not be guaranteed to use the transfer station. Indeed, it was always realized that the ultimate tipping fee would determine to a great extent where most of the city's waste went.

An additional consideration in sizing was that several sister Central Massachusetts Resource Recovery Committee communities might be in need of interim disposal site prior to the opening of the resource recovery plant. Holden's landfill was scheduled to close in 1986. Southborough was having problems getting a guaranteed disposal site. Millbury and Grafton had only limited life remaining in their landfills, and there was a possibility that Northborough would be in interested in shipping waste to the Millbury transfer station for further haul to a disposal site.

Although the details were to be negotiated, it was agreed from the start that Worcester should be responsible for funding the design and construction of the transfer station. Consequently, Worcester had a self-interest in insuring that the station was neither grossly oversized nor gold-plated.

With the expectation that the major share of the city's commercial and industrial tonnage would come to the station if the gate fee were competitive, and with a sense of obligation to the non-residential waste generators to provide a disposal site, it was decided to build a capability to handle 200,000 tons per year of solid waste. This size would take care of the city and at least some of the other CMRRC communities.

Passing from planning to operation, the transfer station has not been competitive enough to capture all of the city's waste. The city's larger commercial haulers are hauling a portion of their waste to a distant commercial landfill which has a substantially lower gate fee. In its first six months of operation the transfer station processed slightly more than 56,000 tons of waste.

LANDFILL PHASEOUT

Phaseout of its landfill was, of course, strictly the city's concern. The phaseout did, however, become part of the planning process for the transfer station. DEQE's closure order specified that there should be an orderly reduction of operations at the landfill leading to complete cessation by June 1, 1985.

Worcester responded with a schedule which initially closed the landfill to loads which would not be acceptable for resource recovery and which would be questionable for acceptance at a transfer station, loads such as industrial grindings and demolition debris.

The next step eliminated vehicles which would not be admitted to either the transfer station or the waste-to-energy plant. Included in this category were cars, station wagons, and pickup trucks. The third planned step was a transition of commercial vehicles from the landfill to the transfer station with the city's sanitation fleet to follow a month later as the fourth step.

The third step did not occur as planned because the transfer station was not ready for break-in operations in May as planned. Consequently, the city held off implementing step three until the completion of operations at the landfill, and steps three and four occurred simultaneously. This surge of solid waste hitting the transfer station on its first day of operation clearly was undesirable. The alternative--phasing out the commercials at the landfill as scheduled in May--without offering a nearby disposal site was unacceptable to the city.

SITE ASSIGNMENT

The first site for the resource recovery facility was assigned by Millbury's Board of Health in May of 1982 with only nominal opposition. Signal, however, had shifted the location a few hundred feet to the west when negotiations to purchase the initial site broke down. What the project had escaped the first time through the process was not to be repeated. A site assignment was given in November of 1984, but it was granted in the face of significant opposition from Millbury residents and two Worcester business firms which were close to the site.

Appeals to the transfer station and resource recovery plant assignments were filed with the DEQE, and civil lawsuits were filed against the DEQE, Signal, and Millbury. In spite of the ominous overtones in the preceding sentence, the threat to the site assignment was never life-threatening to the project. The DEQE held a public hearing on the appeals and subsequently ruled that Millbury's assignment was valid. At the same time DEQE modified the assignment to impose a number of reasonable conditions.

COSTS

As mentioned earlier, it had always been agreed that the capital costs of the transfer station would ultimately be borne by Worcester. On a short-term basis Signal would provide the funds to enable the system to be designed and built.

With the city's concurrence, using the RFP procedure Signal selected an engineering firm to design the station and a waste management company to operate the station and dispose of the waste. Indicative of the good-faith effort by Signal is that the company put out the requests for proposal for both the design and operations functions, received and evaluated the proposals, and made its selections before Worcester had signed a resource recovery agreement and before substantive negotiations had even started on the transfer station.

The base positions from which Signal and Worcester negotiated were basically the same except, of course, from distinctly different perspectives. Signal did not want to be held financially responsible for capital improvements such as the construction of an access road and modifications to Route 20, if it were not going to proceed with the construction of a resource recovery plant.

On the other hand, the city did not want to commit itself financially to anything beyond the design and construction of the transfer station. Specifically, the city did not want to be held responsible for capital costs which could be charged to the resource recovery plant such as the access road and changes to Route 20.

In the final agreement the city agreed to amortize the costs of design and construction of the transfer station and related site work. Signal agreed to switch the amortization period from three to five years at a fixed interest rate. Additionally, Signal agreed to absorb 50% of the site preparation costs that later could be used by the resource recovery plant. It should be noted that this feature was at Signal's risk; it applied even if a decision were made later not to proceed with the waste-to-energy project.

It was agreed that if Signal were to give a go-ahead to resource recovery at anytime during the five year period of the transfer station agreement, the full cost of site work that can be used by the resource recovery plant would switch to Signal. (On July 1, 1985 Signal's Alfred DelBello announced that Signal was going to proceed with construction of a 1500 tons-per-day waste-to-energy plant in Millbury. Design is past the halfway point, equipment has been ordered, and site preparation work is in progress. On-site construction will start this spring.)

Finally, at any time during the five-year period of the transfer station agreement if the resource recovery plant becomes operational, Worcester's obligations to make amortized capital payments will cease.

Signal had recommended selection of the lowest-cost proposal for operation of the transfer station, and the city concurred. The city was not a party to further negotiations between Signal and the operator, but it had done some soul-searching concerning what tonnage to protect contractually. Although the city had accepted the risk of paying capital costs for a station sized to accommodate commercial and industrial wastes, it clearly was unable to commit itself contractually to provide any tonnage except that which it controlled. As a result, only the tonnage collected and deposited by the municipal sanitation fleet was contractually guaranteed. All other tonnage was to be subject to market prices. Worcester's initial cost at the transfer station was $26.50/ton. This price does not include a royalty payment to Millbury or Signal's pass-through costs for managing the operation. These costs total nearly $3.00/ton. There is an escalation feature of 50% of the Consumer Price Index governing future prices.

Millbury informed Signal and Worcester that the town did not intend to use the transfer station now, but it wanted the right to use the station without charge if it needed a disposal site after the third year of operation of the station. Interestingly, this issue involved only Millbury and Worcester and was the last significant issue to be settled. Understandably, Signal said that it was not prepared to underwrite Millbury's disposal costs in a business deal in which the company was confining itself to passing through its actual costs with no provision for profit for Signal.

At first Worcester wanted Millbury to agree to pay a tipping fee equal to the city's. Millbury's proposal was that there should be free disposal for all of its 11,315 annual tons of residential and commercial waste. A compromise was reached with agreement that Worcester would guarantee free disposal of up to 6,000 tons a year of Millbury's residential waste if Millbury started to use the transfer station after its third year of operation.

Signal agreed to levy an escrow charge on commercial tonnage to enable Worcester to accumulate funds to defray expenses to be incurred if Millbury were to use the station after the third year. This provision, however, has been held in abeyance at the city's request in order to hold down commercial costs at the station. Nonetheless, whether or not there is an escrow fund, the city is contractually obligated to Millbury in this matter.

An additional cost aspect is a recoupment charge of $2.00/ton which Signal agreed to collect on Worcester's behalf to help the city to recover some of the significant capital costs of the station. Millbury agreed to assist the cost recovery at the rate of $1.00/ton should it use the station. Rather than receive payment of the capital recoupment money collected, the city agreed to be credited on its monthly invoice from Signal.

One final cost is a royalty which Millbury set as a condition for hosting the transfer station. This payment is equal to the in-lieu-of-taxes payment associated with the resource recovery plant. Against this payment Signal will be credited with any property taxes paid by it to Millbury on account of the transfer station buildings and equipment.

PERMITTING

This section could justifiably have been entitled the Perils of Permitting. It was a difficult process. Among the official bodies involved in the process were the conservation commissions of both Millbury and Worcester, Millbury's planning board, Millbury's building inspector, and the Department of Environmental Quality Engineering. Every permitting action faced serious, determined questioning. Appeals and lawsuits were numerous.

From Worcester's perspective the most menacing moves against the transfer station were the two requests to DEQE for an adjudicatory hearing regarding the order of conditions originally set by Millbury's Conservation Commission and later superseded by the DEQE. This action could have made it impossible to open the transfer station on time. To say that Worcester feared this development is to understate the magnitude of concern. It was devastating to learn that two parties had requested an adjudicatory hearing less than two months prior to the station's scheduled opening. Even if the adjudicatory process produced a favorable finding, as we were confident it would, it would have consumed the most precious commodity of all: time.

Signal's top leadership was joined by the political leadership of Central Massachusetts in meeting with the parties who had requested the adjudicatory hearings in order to work out an adequate response to their concerns. Never throughout the whirlwind planning and implementation of this project was the pressure as intense as it was during this period. That the station opened on time is proof of the success of the extraordinary efforts of corporate and political leaders, notably Signal's Alfred D. DelBello and State Senator John P. Houston.

Lawsuits were tied to the various permits issued to the transfer station project. Suits against Signal, Millbury, and DEQE were dismissed, and a petition for a temporary restraining order to stop the operation of the transfer station was denied in superior court about a week after the transfer station opened.

Throughout the stormy period of permitting, Worcester's role, except for its Conservation Commission, was similar to that of an expectant father. Although intimately involved with the project and vitally concerned with the outcome, the city could only offer moral support and figuratively pace the floor while Signal and Millbury bore the brunt of the attacks on permits which had been granted.

Relatively obscured by the public's involvement with the permitting process was DEQE's role in monitoring the design and construction of the transfer station. A fundamental difference in philosophy - and defensible by both sides - existed between Worcester and the DEQE. It was Worcester's contention that the station was primarily intended for short-term use between closure of its landfill and opening of the resource recovery facility. Therefore, city taxpayers should not be burdened with capitalizing a station built for long-term use; costs should be minimized.

On the other hand, it was DEQE's contention that there was no assurance that a resource recovery plant would be built. (This was prior to Signal's 7/1/85 commitment to proceed with the waste-to-energy project.) DEQE felt that it had to look at the transfer station as if it were going to be Worcester's long-term solution to its solid waste problem. Ultimately, DEQE's approval of the design and of the operations plan reflected more its philosophical approach than that of the city.

TERMS AND OWNERSHIP

It was in this area that it was clear that Millbury was not comfortable with the prospect of either Signal or Worcester owning and operating a transfer station in Millbury on a long-term basis. Signal did not want to put itself in a position where it would plan and build a transfer station which at some time in the future could be used by a competitor. Worcester did not want to spend more than $1 million only to have someone else own the building.

Many, many hours of negotiations were devoted to the issues of length of operation of the station and ownership. At one point or another during these negotiations each of the parties was to own the station and the term of operation was at various times three, five, and eight years.

As the tripartite negotiations closed in on agreement on these issues, other related issues such as the capital recoupment payments described earlier became part of the discussions.

The final arrangement agreed to by Millbury, Signal, and Worcester provided that Signal would manage the operation of the transfer station for five years or until a resource recovery facility were operational, whichever first occurred. When the resource recovery plant becomes operational, Signal would be permitted to operate the transfer station as a backup facility.

If the resource recovery facility is not operational at the end of five years of operation of the transfer station, ownership of the transfer station will be transferred to Millbury by Signal for a nominal consideration, $1.00. The transfer, if it occurs, will include 15 acres of land and the access road to the land.

In the event that ownership were to pass to Millbury, the deed given by Signal would provide that for five years the land must be used as a site for a transfer station or a resource recovery plant unless Worcester had provided for other means of waste disposal extending beyond the five-year restriction.

CONSTRUCTION

It may be misleading to place construction in the highest position of difficulty. Given a reasonable timetable, construction would have been among the least difficult issues to handle. The problem was that everything that adversely affected most of the other issues impacted negatively on the construction phase.

What was projected in October of 1984 to be a tight construction schedule through the spring of 1985 turned out to be a cliff-hanger of the first magnitude. A portion of the access road had to be relocated to protect wetlands, and it was not until the matter of adjudicatory hearings had been cleared up in mid-April that Signal knew it was going to have an access road to the transfer station.

Site clearing started in mid-February. it had been estimated by the contractor that concrete pourings had to be started by March 19 or there was no assurance that the station would be ready on time. DEQE had cautioned all concerned that construction could not start until it had approved the plans. As mentioned above, hard negotiations were in progress on the plans, but it was not until March 19 that DEQE was satisfied with the plans and issued its proposal. There were less than 11 weeks to

the scheduled opening, and there were permitting problems yet to overcome.

By late March concrete had not yet been poured, and rock had been encountered, creating the need for blasting. By mid-April construction was at full speed, and it was at this time that those of us who had been on pins-and-needles about the chances of completing on time began to believe that there was a fighting chance of success.

With a month to go to opening, excavation to subgrade on Route 20 was 80% complete, the fill for the access road was 60% done, the concrete walls for the transfer station were 35% done, foundation work was 90% done as was rock drilling, and excavation for the site road was at 70%. At that time 40 workers were working extended hours for six days a week. (Sunday work was proscribed by the planning board.)

On May 10, John T. Dowd, Signal vice president for construction, told DEQE and Worcester that the station would be ready for operations as scheduled. He was as good as his word although observers continued to worry when as late as May 20 the tipping floor slab had not been poured, and roofing and siding had not been attached to the building.

On Thursday, May 30, Worcester signed the transfer station agreement. On the following day, Friday, May 31, Signal and Millbury signed the agreement. Millbury's buildings inspector issued a temporary occupancy permit on the same day, and Worcester landfill went out of business at 4:00 that day.

On Monday, June 3, at 7:00 a.m. the Millbury transfer station opened for business.

LESSONS LEARNED

As in any endeavor of this sort a study of the proceedings leads to conclusions and recommendations concerning how the job should have been done. It is tempting to say that lesson #1 is that planning a transfer station or anything significant from a municipal viewpoint should be done in an orderly manner, not in a crisis environment, not under the pressure of a deadline. In this case, however, this was <u>not</u> a lesson learned.

Worcester entered negotiations with Millbury and Signal in a solid waste emergency. In the classic negotiating sense the city was ill prepared for hard negotiations because it had virtually nothing to barter and clearly was in a weak position for negotiations in the usual sense.

If this had been an orderly, due course negotiating process, it is improbable that Signal would have been as generous as it was. The difficulties accepted by Signal, and the very real hardships it endured particularly in the various permitting phases never showed up on a balance sheet except possibly in a

negative sense. Certainly, Signal perceived that the chances of successfully concluding a resource recovery agreement would be enhanced by its carrying a share of Worcester's burden on the transfer station. Yet, if Worcester had not been in the corner it was, Signal may have thought twice about sticking its neck out on the transfer station issue.

Worcester was negotiating with both Signal and Millbury from a position of weakness. Neither party exploited that position. Never in this observer's experience has the expression "good faith" had as much meaning as it had during these negotiations. Signal made a significant financial commitment before either the resource recovery or transfer station agreements were signed.

Millbury's Board of Selectmen consented to the transfer station primarily as an assist to Worcester and other CMRRC communities which might need an interim disposal site. The town, however, wanted protection from the transfer station becoming the long-range, rather than the interim, solution to the problem of solid waste disposal. Additionally, it wanted to protect its right to use the station with favorable financial considerations.

The emergency nature of the project ensured that there was no gamesmanship in negotiations. No sham positions were taken to protect real interests. Pawns were not routinely exchanged to disguise the real intentions of the players. Indeed, there were no players; there was no time for it. Instead of posturing, there was directness.

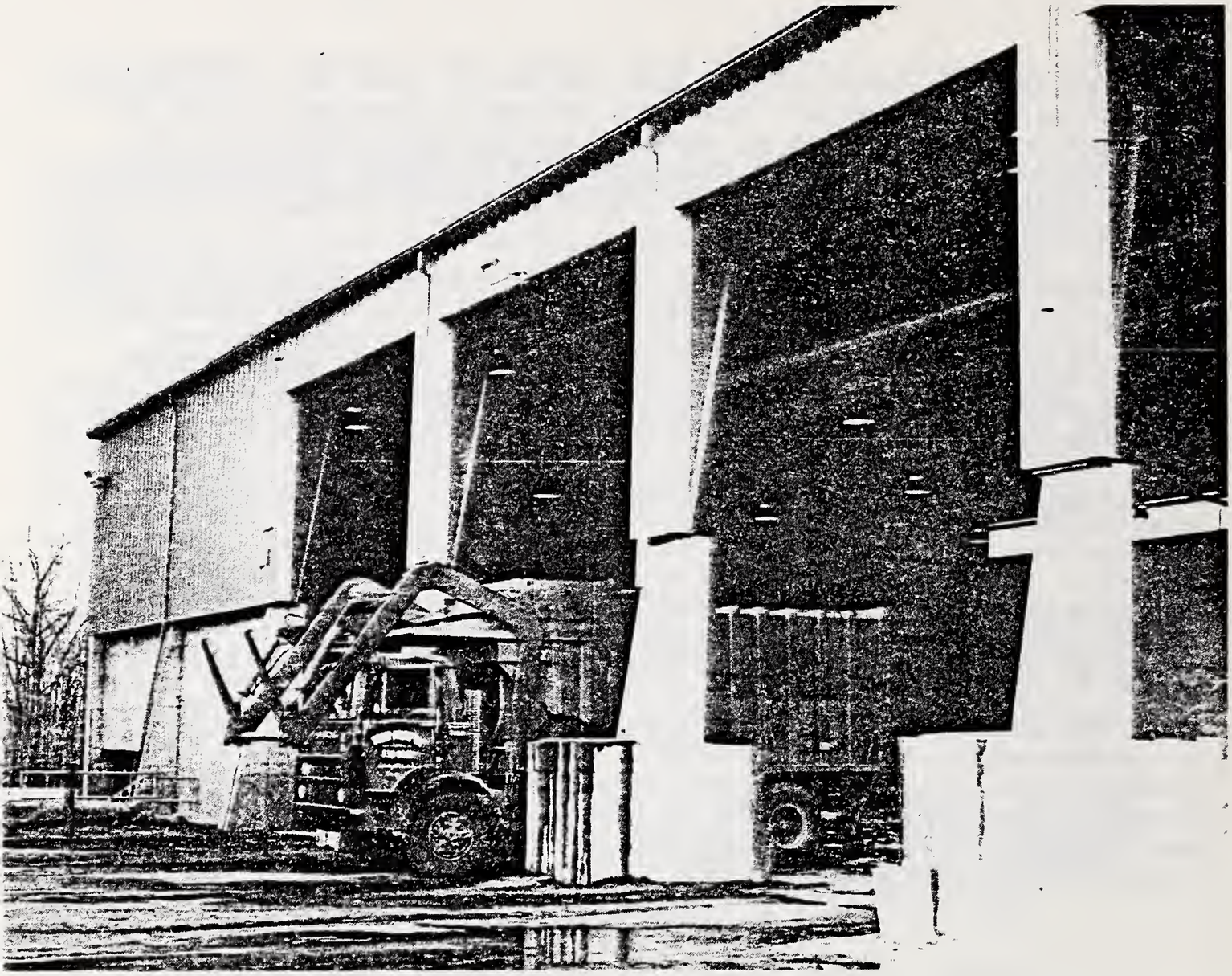


Photo By J.M. DiLiddo

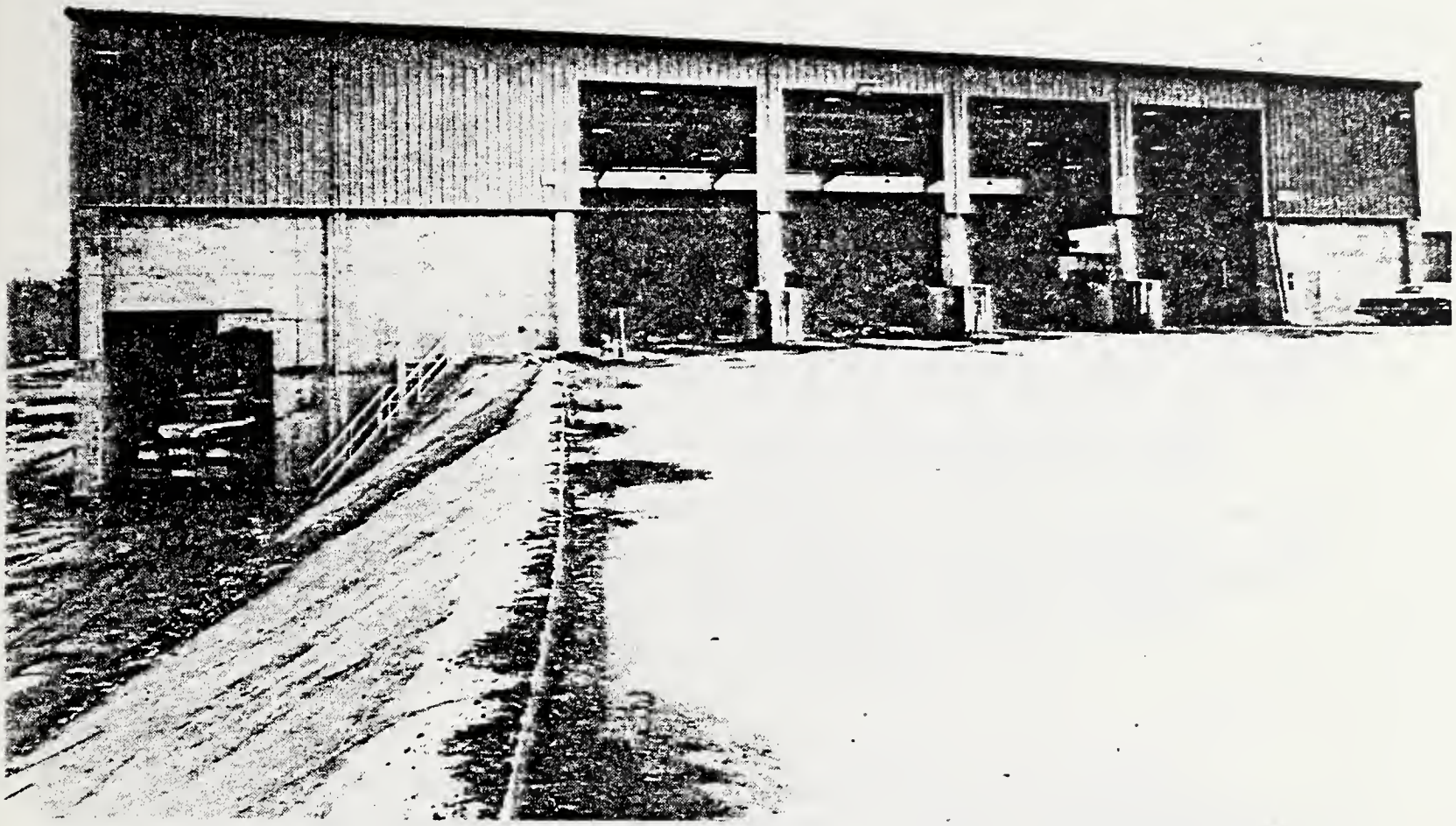


Photo By J.M. DiLiddo

Transfer Station Operation and Maintenance

By John Boland
Superintendent,
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Southborough, MA

INTRODUCTION

This review of the maintenance and operation of Southborough's Refuse Transfer Station includes a background of events which led to the decision to choose this method of solid waste handling and this particular design of transfer station.

To the average citizen of Southborough, the Transfer Station is the most visible service offered by the municipality. This is the most critical factor which must be considered in the design, maintenance and operation of this type of facility. The average taxpayer who chooses to deposit his or her own rubbish at the Transfer Station will do so on a regular basis, most often weekly. That same taxpayer will visit the Police or Fire Stations perhaps once a year and seldom, if ever, visit the Town Hall or Public Works office. As a result, the employees at the Transfer Station will have direct contact with more taxpayers than all the Police Officers, Firefighters, Public Works employees and Administrative Staff combined.

BACKGROUND

The Town of Southborough is a primarily residential community of approximately 6500 people, located approximately 30 miles west of Boston at the intersection of Route 9, Interstate 495 and the Massachusetts Turnpike. The current amount of solid waste processed through the Transfer Station is approximately 100 tons per week.

The Town Dump has been an issue in Southborough for decades, just as dumps have been in many other communities. The old Town Dump opened following the Hurricane of 1938 as stump dump and was closed shortly thereafter. It opened once again in the mid-1950's as an open burning dump. This situation continued until 1969 when the town purchased a second hand shovel dozer and converted the old open burning dump into a "landfill"; this pattern was also followed by many other communities. Because of the limited available space, the landfill began to fill up virtually overnight. To confront the problem, a site selection committee was formed and charged with proposing a new landfill within the Town and investigating various sites. After a detailed engineering study the committee proposed a new 60 acre landfill. This proposal was rejected by the voters.

The next task was investigating the construction of a transfer station. This investigation was directed by the fact that door-to-door residential rubbish collection had been overwhelmingly rejected twice in recent history, and made use of the extensive landfill study. After a thorough investigation and

preparation of of preliminary design and cost estimates, the committee reported that the landfill proposal was the most economical over the long term although it was initially more expensive. After considering the transfer station and landfill proposals, the committee recommended construction of the Transfer Station for various reasons, the most important of which was their opinion that the future of solid waste disposal would be in regional, rather local, solutions. The Town overwhelmingly accepted the Transfer Station proposal.

DESIGN

The design of Southborough's Refuse Transfer Station was based on two needs: first, the need to service the community's waste disposal needs; second, to do so with minimal staffing. So, the station design called for a unitized Transfer Station utilizing a 110 cubic yard hydraulic pushpit in conjunction with a 6 cubic yard stationary compactor. The entire unit is hydraulically operated by one person via electronic controls in a control room overlooking the unit.

The site chosen for the Transfer Station satisfied several extremely important considerations. First, of the site chosen for the Transfer Station was part of the parcel then occupied by the existing Highway Department office and garage. Since the Highway Department is charged with solid waste disposal, this site provided not only consolidation and control but assured that the necessary support services would be readily available. Second, the site is centrally located and equally accessible to all areas of the community. Third, there is access to the site is via Route 85, a major artery. Fourth, the site is zoned for an Industrial Park, so the operation is consistent with the neighborhood. Fifth, the site characteristics included a rocky knoll which provided the difference in elevation required between the tipping floor and the Transfer Trailer pad.

Although the site at first appeared to be ideal, it was found, subsequent to Transfer Station construction and operation, to have insufficient area to support all the various Highway Department operations. Fortunately, adjacent property was available and additional land acquisition were made.

OPERATION AND MAINTENANCE

The operation of the Transfer Station is a relatively routine matter consisting of regular operation of the push pit and compactor, removing and parking full transfer trailers, cleaning up loose debris which may have fallen to the ground, and replacing an empty trailer. Other duties are primarily housekeeping chores, particularly cleaning up of the tipping floor apron and grounds-keeping.

The second phase of the operation is the transportation of rubbish to the ultimate disposal site. Initially the Town of Southborough contracted for this service, with trucking and

disposal being performed by the contractor at one price. The Town retained ownership of the transfer trailers. Four trailers were left on the site affording sufficient storage capacity for the transfer operation. The town has recently acquired an over-the-road-tractor and now final haul is done by a Highway Department employee. Because the town owns four transfer trailers, there is sufficient on-site storage capacity to allow this part-time operation to be scheduled to coincide with not only the Transfer Station operation but also with the various other Highway Department activities. After disposing of the waste, the employee returns to work on whatever activity the Highway Department may be involved in at the time. This situation affords a great deal more control over the entire operation than does an outside contract.

Maintenance of the system is again a relatively routine matter involving regular checks of oil levels, greasing, cleaning, tightening packings, oil and filter changes at regular intervals as per the manufacturers recommendation, etc. Maintenance of the rolling stock is similar to any other fleet maintenance operation with the exception of tires. If the ultimate disposal is by landfill, tire wear is high, and sufficient spare tires must be made available.

There are a number of other factors which should be taken into account during the design phase to ensure smooth operation. Particular emphasis should be placed not only on the prevailing winds but also on any peculiar wind currents at the precise location of the tipping floor. This may entail physically monitoring wind speed and direction at the site for a period of time and designing wind breaks. This may save a great deal of effort and frustration later.

Traffic is a major consideration. Up-to-date traffic counts should establish not only total volume but also peak volumes. These figures are used in determining the size of the station and its hours of operation. It must also be driver-proof: not all drivers are proficient in the operation of their cars. Although the Southborough Transfer Station is designed to allow sufficient room for eight vehicles on the tipping floor at one time, in practice the maximum is six and often less than that. As well, some drivers will put their vehicle in reverse and back up until they hit something. In Southborough's case that "something" was the safety railings around the push pit, which had to be redesigned and replaced.

There are several points to be remembered with regard to the hydraulic unit. The design must take into consideration the large size of the hydraulic components comprising the unit, and sufficient room must be provided for repair and replacement. The power unit should also be kept as close as possible to the hydraulic pistons on the push pit and compactor minimizing troublesome piping and potential problems. Although down-time on a unit of this nature is minimal, when it does occur the results can be disastrous. A sufficient inventory of spare parts should

be kept on hand at all times.

Although most types of transfer trailers may be used in this operation, they are likely to require certain modifications to adapt to the particular compactor design. Consideration should be given to acquiring transfer trailers from the same manufacturer that provided the compaction equipment.

CONCLUSION

Many communities are under considerable pressure to find solid waste disposal solutions as rapidly as possible. Every community has unique needs; since many transfer station designs are available, considerable time should be allowed to investigate the community's various available options. On-site visits at the various transfer stations throughout the area should be part of the decision-making process.

Approval Process and Assessment Criteria for Proposed Transfer Stations

Prepared by
Allen Dussault, Jr.
DEQE Environmental Analyst

As the pace of landfill closings across the state has accelerated and refuse hauling distances have become greater, the increasing demand for transfer stations has resulted in a greater number of such facilities operating in Massachusetts.

Transfer stations provide two basic services:

1) they serve as a central point to unload refuse within reasonable proximity of the sources of generation; and

2) they provide a means to process incoming refuse to improve handling properties or acceptability for ultimate disposal.

This is achieved by processing the waste to reduce volume, remove unwanted materials and/or package the refuse into a more manageable form.

Chapter 111, Section 150A of Massachusetts General Laws and Massachusetts Environmental Policy Act (MEPA) require a project proponent seeking to construct a solid waste transfer station undergo a specific approval process to assess and mitigate potential impacts to the health and/or environment of the host communities. This process closely parallels the approval process for a sanitary landfill and includes the following steps.

1) The project proponent must first obtain a site assignment from the local Board of Health (after a public hearing has been held). This is necessary when siting a facility in a "virgin" or unassigned area. Under such circumstances the local Board of Health is, in effect, prescribing a designated land use compatible with the area so as to protect the public "health, comfort and convenience" as required by Section 150A of Chapter 111 of the General Laws.

In instances where the proposed site may have been or is currently being used as a sanitary landfill, the Board of Health will have already granted a site assignment for a "facility" without distinguishing a landfill as such, then no further application to the Board of Health is required and existing conditions of assignment can be applied to the proposed transfer station.
If, however, the existing assignment is for a

specific type of disposal facility, other than a transfer station, then the assignment must be modified by the local Board of Health to allow a transfer station at that site. Under these circumstances the Board has the authority to impose a different set of conditions than those stipulated under previous land use.

2) The second step in the approval process involves filing an Environmental Notification Form (ENF) with the Executive Office of Environmental Affairs (EOEA) describing the environmental impacts of the project. This is required in the case of transfer stations only when incoming refuse is to be 50 tons/day or greater. At the discretion of EOEA and depending on the nature and extent of the impacts identified in the ENF, and Environmental Impact Report (EIR) may be required as well. This would entail detailed investigation and documentation of the potential project impacts culminating in a report that addresses potential adverse affects, mitigating measures and alternatives to the project. In instances where 300 tons/day or more are to be received at the proposed facility, an EIR is required in all cases.

   The criteria used to assess project impacts identified in an EIR are, to a large degree, specific to the project subject to the Massachusetts Environmental Policy Act (MEPA).
   These include the physical, biological, economic and social conditions of a proposed site, its immediate surroundings and potential areas of impact.

Specific impacts could be are traffic problems, noise, dust, litter and odor problems. These impacts would take on commensurately greater importance in areas with greater numbers of residential dwellings or where population densities are high. Mitigation measures that ameliorate potential impacts should be incorporated into any proposed facility design and discussed accordingly in the ENF and EIR if required.

3) The final step necessary to receive approval to a solid waste transfer station involves submitting to the appropriate DEQE Regional Office for approval engineering plans accompanied by all information, documents and design specifications required by Department Regulations 310 CMR 18.00 - "Installation, Operation and Maintenance of Solid Waste Transfer Stations". Plan approval can occur only after site assignment has been granted, MEPA review completed and a positive determination by the Secretary of Environmental Affairs made. However, plans may be submitted to DEQE prior to MEPA assessment. In instances where site

assignment for a "facility" is in effect and MEPA review not required, separate plan approval from DEQE is still required unless a specifically referenced plan was previously submitted to and approved by DEQE.

Specific engineering requirements necessary for plan approval can be found in 310 CMR 18.00, cited above. Provisions for the following are of particular importance:

- suitable shelter for all mechanical equipment and personnel
- fire protection equipment including adequate supply of water under pressure with sufficient fire hoses
- weigh scales and/or other measuring devices as required by the Department
- paved access roads in good repair
- fences, gates and other suitable barriers to limit unauthorized access to the facility
- standby equipment as backup in the event of breakdown of regular fire equipment
- refuse compactors and/or other processing units to be provided in duplicate with each capable of handling the expected design tons/day except where the facility handles less than 150 tons/day or where the facility has an alternate method to handle all incoming refuse

DEQE uses these and other requirements specified in 310 CMR 18.00 to assess the relative technical merits of a submitted transfer station plan. It is on this basis that DEQE approves engineering plans, assuming the plans conform to all other relevant laws and regulations of the Commonwealth as well as applicable local by-laws and ordinances.

If all of the appropriate conditions specified above are met and plan approval is granted, two final procedures are necessary before a facility can become operational. They are:

- o The engineer supervising construction must submit a written certification of construction along with a copy of the contract or agreement for location of final disposal of refuse.
- o The Department must inspect the construction of the facility to determine compliance with approved plans.

If the inspection finds the facility in compliance with the

approved plans, the Department will issue a letter of compliance. This letter constitutes approval for the agency/company responsible for the facility to commence operations.

Capital, Operation and Maintenance Costs of Solid Waste Transfer Stations

By Anthony J. Zuena, P.E.
S.E.A. Consultants, Inc.
Cambridge, MA

As solid waste disposal sites have become further removed from population centers, the need to develop efficient means of transporting waste from point of origin to point of disposal has led to the development of a variety of centralized collection and transfer facilities. These facilities range in complexity from an arrangement of "dumpster" type containers where homeowners would deposit household refuse to elaborate, fully enclosed facilities, containing mechanical compaction and/or loading equipment used in conjunction with very large transfer trailers.

The purpose of this section is to briefly describe four types of transfer facilities and their associated capital, operation and maintenance costs. The smallest facility described would have a capacity of approximately five tons per day serving a typical residential community of approximately 2,000 to 3,000 people. The next largest facility presented has a capacity of approximately 20 tons per day and would serve a primarily residential community with a population of 8,000 to 10,000 with typical commercial support facilities. The third facility described has a capacity of 65 tons per day serving a community of approximately 25,000 people with a slightly higher level of commercial and industrial facilities within the city or town. The last facility described has a design capacity of 150 tons per day. This facility might typically serve a community of 50,000 people which has a moderate level of commercial/industrial development.

It is noted that cost data presented herein has been adjusted to January 1986 cost indices and does not include the cost of land due to its extreme variability.

The smallest facility, handling approximately 5 tons per day of refuse, in its simplest form may be a series of dumpsters or an open top roll-off container on a graded and paved site. A slightly more elaborate facility may include a compactor unit coupled with a roll off box container. Either concept should have a holding capacity of 20 to 40 cubic yards requiring removal of the refuse from the site on the order of once per day. Figure 1 is a photograph of the recently completed transfer station in the Town of Lincoln, Massachusetts. This facility is somewhat larger than the previously described facility but is a fair representation of the small compaction type transfer station. The capital cost of this kind of transfer station, including necessary site work such as security fencing, grade separation walls and the compactor with two compaction roll off boxes, would be in the range of $120,000 to $175,000. Operation and maintenance costs, excluding tipping fees at the ultimate point of disposal, would be about $20,000 to $25,000 per year and

Solid Waste Transfer Station
Lincoln, Massachusetts

Figure 1

require 0.5 to 1.0 person to adequately supervise and maintain the facility. This operating budget assumes that the community would contract with a private firm to haul the roll off boxes to the final point of disposal.

The 20 ton per day facility, serving a population of 8,000 to 10,000 could also be constructed using two significantly different design concepts which affect flexibility, the type and number of vehicles which have access to the facility and the capital cost. A facility which utilizes an open top (non-compaction) trailer system in conjunction with a tipping floor in a semi or fully enclosed building begins to become cost effective in this capacity range. Additionally, this type of facility has the advantage over the "mini" compaction type facility in that it can readily accommodate commercial compaction or municipal curbside collection vehicles and greater volumes of residential traffic during the typical Saturday morning peak hours. The mini-compaction type facilities in this capacity range have the disadvantage of not being able to efficiently recompact previously compacted refuse from commercial vehicles without "bridging" or overloading the typical 3 to 5 cubic yard stationary compactors. Additionally, this type of facility severely restricts the number of private homeowner vehicles which can unload their refuse at any one time.

The Town of Holden, Massachusetts is presently engaged in the design of a transfer station incorporating the tipping floor/open top trailer loading concept described above. Additionally, the Towns of Medfield and Acton are nearing completion of construction of similar facilities. All three of these facilities are in the 20 to 50 ton per day capacity range and will be able to accommodate 200 to 300 vehicles per hour during peak weekend periods. Figure 2 is a perspective view and Figure 3 is a plan/elevation view of the Acton Transfer Station.

The capital cost of a 20 ton per day facility incorporating a tipping floor, fully enclosed building and site work will range from approximately $450,000 to $550,000 excluding rolling stock. Open top transfer trailers with 110 cubic yard capacity are approximately $40,000 per unit and generally two are required in this capacity range. The tractor would have a capital cost of $65,000 to $80,000. At the community's option, the rolling stock may be either leased or purchased, which would affect the initial capital investment or the annual operating budget depending upon the method of financing. If purchased outright, an additional capital investment of $155,000 to $170,000 would be required.

A staff of two full-time personnel would be required to operate and maintain a facility in the 20 ton per day capacity range. The annual operating budget, excluding the actual tipping fees at the point of ultimate disposal, would be approximately $50,000 to $60,000 per year.

A 65 ton per day facility serving a community of approximately 25,000 people, would almost certainly be designed

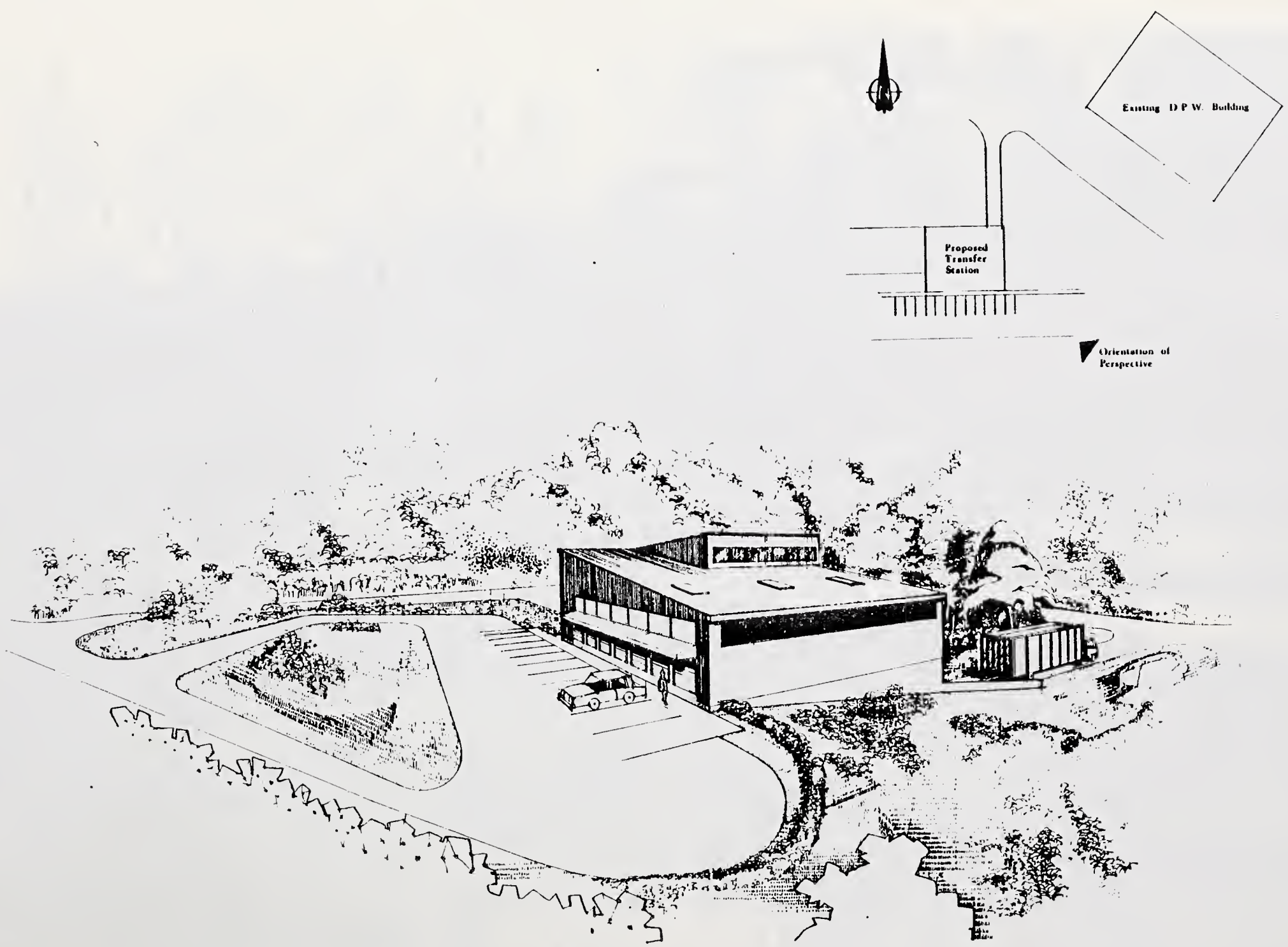

Figure 2

Perspective View

March 1983

Solid Waste Transfer Station

Acton, Massachusetts

SEA Consultants Inc.

Engineers Architects

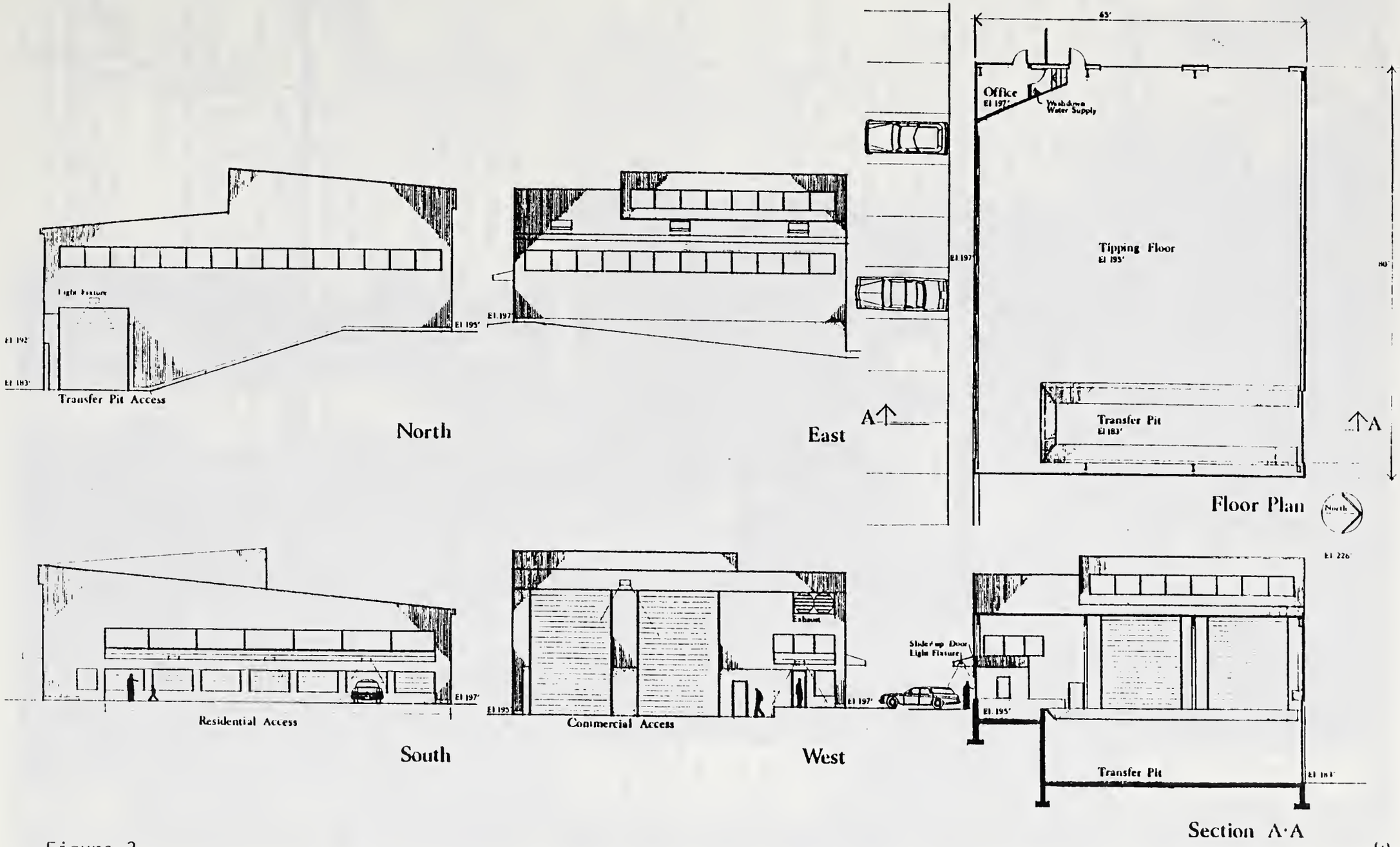

Figure 3

Preliminary Building Plan

Scale: 1/8" = 1'-0" February, 1983

Solid Waste Transfer Station

Acton, Massachusetts

SEA Consultants Inc.

Engineers/Architects

utilizing the open top trailer/tipping floor and fully enclosed building concept. Open top trailers have the advantage of having the same hauling capacity as compaction trailers due to their larger size and also are lighter and easier to maintain than compaction trailers. Additionally, the non-compaction trailer concept eliminates the more extensive grade separations needed in the compaction type transfer stations.

Capital costs of this facility may vary widely depending upon the number of private vehicles likely to have access to the facility during peak periods. If the tonnage is generated almost exclusively with large commercial compaction vehicles, the capital cost range provided for the 20 ton per day facility may also be representative of this size range. If, however, a more typical mix of homeowner and commercial vehicles were to utilize the facility, the site layout would become more elaborate and the building dimensions would likely be increased over the 20 ton per day facility. Assuming both residential and commercial vehicle access, capital costs for the building and site work would be approximately $700,000 to $800,000 excluding rolling stock. Rolling stock costs would be increased in that two to three trailers, and potentially two tractors, may be required depending upon round trip time requirements between the station and ultimate point of disposal. Therefore, rolling stock will increase the capital investment required by $220,000 to $265,000.

The staff required to properly operate and maintain a 65 ton per day facility would range in size from 2.5 to 3.5 individuals depending upon the hauling distance to the ultimate disposal site and whether one or two transfer vehicle drivers are required. Annual operation and maintenance costs for this facility would likely range from $90,000 to $110,000 per year, excluding ultimate disposal tipping fees.

Figure 4 is a photograph of the Town of Southborough transfer station which was one of the first such municipal facilities in the Commonwealth. The facility was constructed in the early 1970's and utilizes a large compaction system which is mechanically coupled to 75 cubic yard compaction trailers.

The largest transfer station to be considered in this discussion is one that would process approximately 150 tons per day and service a moderately industralized community of approximately 50,000 people. Most facilities in this size range or larger are privately owned and operated by commercial solid waste disposal firms. Almost without exception, all of these facilities construction in the last five years utilize the tipping floor and open top trailer loading concept and generally incorporate fully enclosed buildings for purposes of windblown litter and vector controls and also for security reasons.

Capital and operating cost data for municipal facilities in this size range is less readily available. Therefore, the cost information provided should be used for guidance purposes only and should be more thoroughly investigated prior to implementing a specific solid waste management strategy.

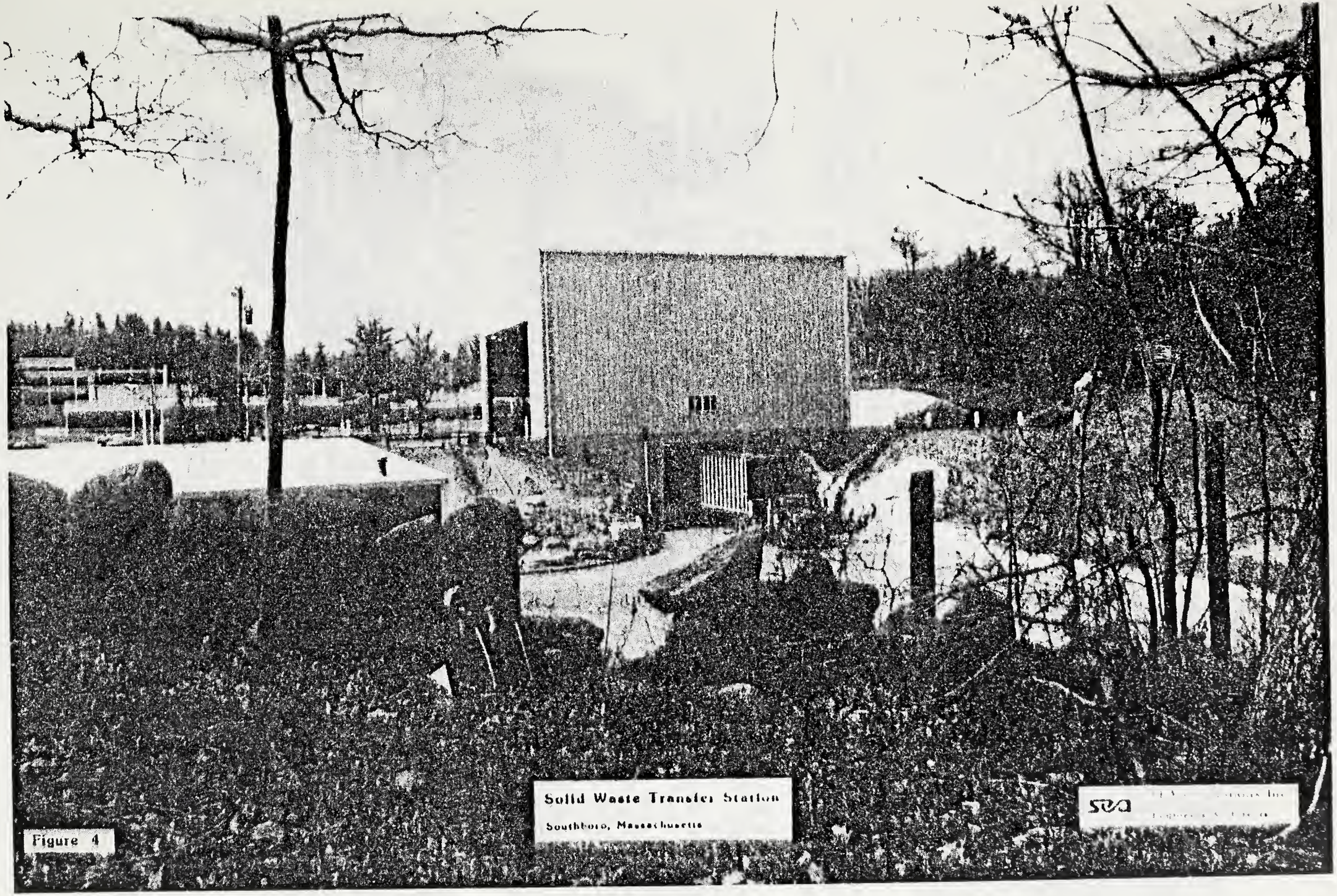
Solid Waste Transfer Station
Southboro, Massachusetts
sea

Figure 4

It is assumed that a facility of this size would receive the vast majority of the solid waste tonnage from commercial compaction and curbside collection vehicles. Most communities in this size range now provide this municipal service which eliminates the need for more elaborate site and building layouts which would be required to accommodate large volumes of residential traffic at the facility. Under this basic assumption of collection vehicles only, the capital cost of a 150 ton per day facility will likely be in the range of $800,000 to $1,000,000, excluding rolling stock. To operate efficiently, this facility would require a fleet of four to five open top trailers each with 110 cubic yard capacity and minimum of two to three transfer tractors. Therefore, the additional capital investment in rolling stock would be approximately $310,000 to $420,000.

Efficient operation and maintenance of a 150 ton per day facility would require a staff of approximately five people and an annual budget of $200,000 to $220,000 excluding tipping fees at the point of ultimate disposal.

Table 1 summarizes the capital, operation and maintenance cost data presented for the four transfer stations described herein. Figure 5, is a graphical representation of the cost date presented in this discussion. Inherent assumptions include a debt retirement of the site and building capital investment over a period of 20 years at an interest rate of 10 percent and rolling stock debt retirement over a period of 10 years at an interest rate of 10 percent.

Additional assumptions pertaining to hauling distance to ultimate point of disposal, transfer trailer capacity and labor costs are consistent with those started in Table 1.

In summary, transfer stations may represent a technically sound and cost effective solution to the solid waste management problem faced by many Massachusetts communities. However, many variables, including refuse tonnage generated, the number and types of vehicles utilizing the facility, the basic design concept incorporated, and hauling distance to the ultimate point of disposal must be thoroughly evaluated before an accurate cost analysis can be developed and the cost effective strategy selected.

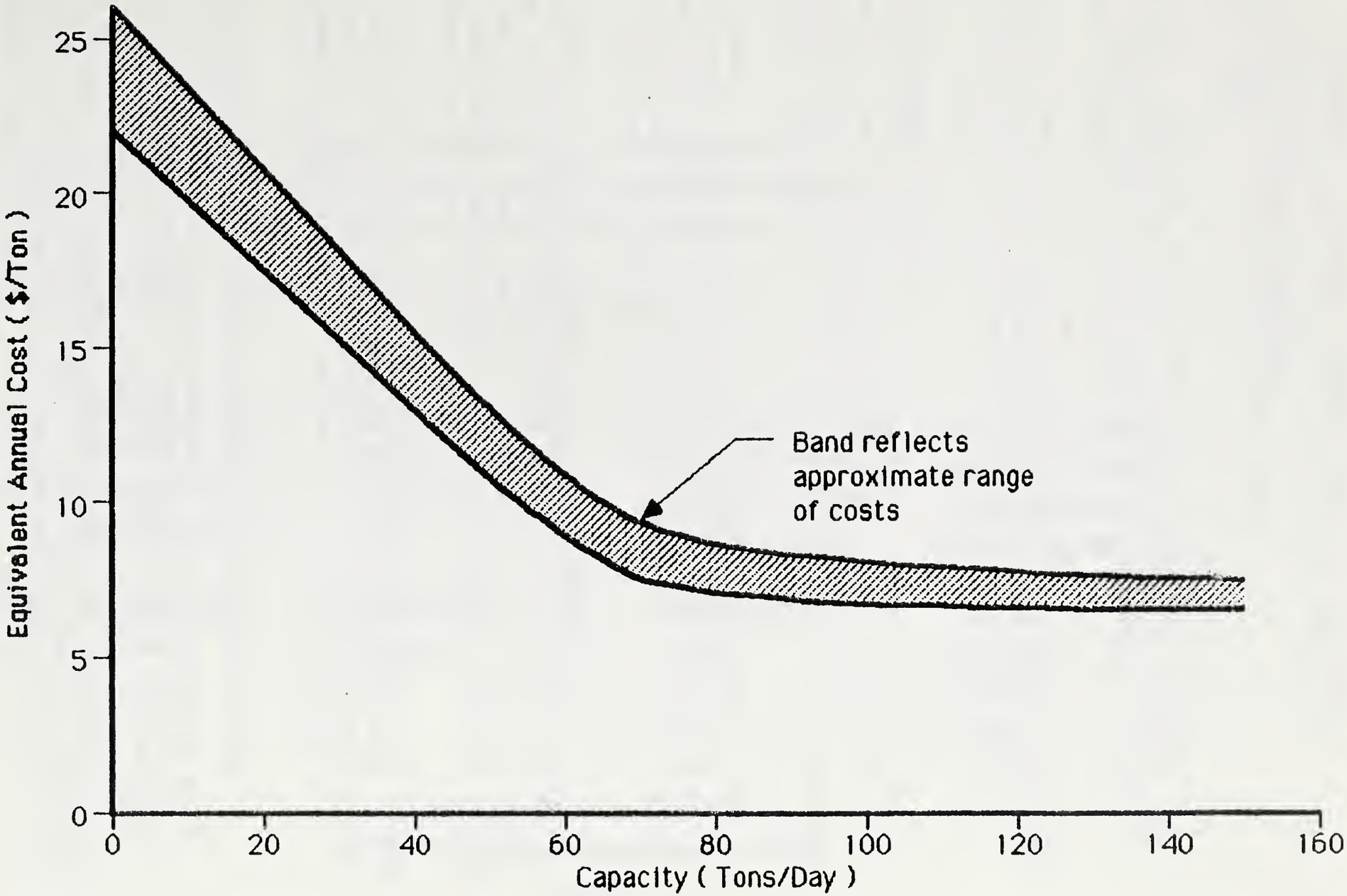

Figure 5

Transfer Station Equivalent Annual Costs As A Function Of Capacity

SEA Consultants Inc.
Engineers Architects

Table 1

Capital, Operation and Maintenance Costs

Solid Waste Transfer Stations

Capacity (ton/day)	Site/ Building Costs	Rolling Stock Cost	Total Capital Cost	Annual Operation & Maintenance Cost (2)
5	$120,000-$175,000	(1)	$120,000-$175,000	$20,000-$25,000
20	$450,000-$550,000	$155,000-$170,000	$605,000-$720,000	$50,000-$60,000
65	$700,000-$800,000	$220,000-$265,000	$920,000-$1,065,000	$90,000-$110,000
150	$800,000-$1,000,000	$310,000-$420,000	$1,110,000-$1,420,000	$200,000-$220,000

Notes

(1) Equipment generally leased or transported on private contract basis.

(2) Annual operation and maintenance costs are based on an annual labor cost of $20,000 per year, including fringe benefits, and vehicle maintenance costs at $0.65 per mile, assuming a 60 mile round trip and 20 ton payload per trip.

Choosing the Right Transfer Station Equipment

By Barry W. Hager, President
Metal Marketing Solid Waste Equipment,
Dover, NH

Over the last ten years, Metal Marketing Solid Waste Equipment has installed some 50 transfer stations. In that time we have learned that no two communities are the same in their solid waste disposal requirements.

We have identified four types of transfer station. The types of transfer station are defined primarily by the population served. This article will examine the four types, and their respective equipment needs.

One: Mini Transfer Station.

This transfer station is adequate for towns of 4,000 or fewer people. Residents would bring their trash to the facility, rather than having it collected at the curbside by the municipality. This type of transfer station would not accommodate large refuse vehicles.

Residents' waste would be compacted and then dumped into roll-off trucks, operated by private haulers contracted by the town, and then taken to the final disposal site. Construction (not including enclosure) and equipment costs for a mini transfer station range from $75,000 to $125,000.

Two: Dual-Mini Transfer Station with dual compaction.

Towns with populations of between 3,000 and 10,000 people could use this type of transfer station. This type has two compactors, rather than the single compactor in the mini transfer station, and could accept waste from small refuse vehicles (using some compaction) as well as residents' vehicles.

This type of transfer station would handle between 15 and 20 tons per day, and could be expanded if additional roll-off containers were acquired. Construction (not including enclosure) and equipment costs for this transfer station run between $100,000 and $190,000.

Three: Transfer Station with 75yd trailers and high-volume hydraulic compaction.

This type of transfer station would suit a community with curbside waste collection by refuse packer trucks. Compactors at the transfer station would be able to handle up to 20 tons per load, or 10 cubic yards, and to handle a volume of 400 to 500 cubic yards per hour. Depending on the number of compactors and trailers used, this transfer station would cost between $200,000 and $250,000 for construction and equipment. This includes a 40' x 65' three-sided enclosure.

Four: Transfer Station with 100yd open-top trailers.

This is also a high volume transfer station, but does less compaction. Waste is deposited onto a tipping floor rather than into a compactor. It is minimally compacted by being run over by a front-end loader, which then scoops up the waste and deposits it into an open-top trailer. While this facility does not have the large electrical supply requirements of a transfer station with hydraulic compaction capacity, it does require a large enclosed tipping area. Costs for this type of transfer station are $50,000 for each trailer and $200,000 for the building.

Financing Solid Waste Transfer Stations

By Edward H. Dlott
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Cities and towns have several options available to them for financing, construction, and operation of solid waste transfer stations. These options generally fall within two broad categories: public financing and private financing. The former involves financing by a municipality or group of municipalities from current cash flow, reserves or borrowed funds; the latter involves contracting with a private vendor who finances, builds and operates the facility. There are numerous approaches and variations within each of these general categories which warrant careful evaluation by municipal officials embarking on a transfer station program.

An evaluation of the cost and feasibility of alternative financing approaches should be done in the context of a transfer station as a revenue-producing facility. Typically a transfer station receives waste from direct municipal residential collections, commercial haulers and direct industrial users. For the publicly financed facilities, revenues obtained from tipping fees paid by the facility's users can help offset the municipality's cost of operating and financing the facility. Setting up an enterprise fund for the facility would clearly show the net cost of operations. For a privately operated and financed facility, the revenue the vendor receives from outside users can help reduce the tipping fee paid by the municipality.

An analysis of financing options should consider the costs and benefits of each approach to determine the one that best meets a municipality's financial and management goals. The evaluation should also consider the potential impact of pending federal tax legislation which could affect the cost of both public and private financing approaches. A community's financial advisor should be consulted to assist in this evaluation.

A. PUBLIC FINANCING APPROACHES

1. Current Revenues and Reserves

Municipalities can use a variety of public financing mechanisms to finance construction/acquisition of a transfer station. The simplest is to pay for it out of current revenues -- i.e. from an appropriation in the annual budget. Since the cost of land acquisition and construction of a station is usually less than $500,000 some communities might be able to pay the cost in "one shot" from the operating budget.

A community which cannot afford to finance a transfer station from current revenues should consider using some of its free

cash, either alone, or in combination with other current revenues. Some communities accumulate free cash balances each year which may be sufficient to pay for the cost of a transfer station. Local officials should avoid excessive drawdown of free cash, however, lest there be insufficient balance left to maintain financial flexibility and to protect the community's credit rating. Generally a goal should be to maintain free cash equal to about 3% - 5% of revenue.

Alternatively, a community could "save" for the facility by appropriating an amount into a stabilization fund each year until there are sufficient amounts in the fund to pay for the facility alone or in combination with other revenues. A municipality is allowed to maintain a stabilization fund equal to 10% of its equalized valuation. A 2/3 vote of the legislative body (i.e. town meeting or City Council) is required to appropriate money out of a stabilization fund.

Either of these current revenue financing approaches, alone or in combination, would enable a municipality to finance a transfer station without incurring the interest and administrative costs entailed by issuing debt.

2. Debt Financing

Communities able to afford to finance a transfer facility from reserves or current revenues may want to spread the cost of the facility out over a number of years by borrowing the amount needed for construction. The cost of a solid waste transfer station (generally less than $500,000) precludes the feasibility of selling bonds <u>solely</u> for that purpose. If a community wishes to amortize the cost over a long period, however, and is already selling bonds for other purposes, it could include the cost of the transfer station as part of the bond issue. This would enable the community to finance the facility for a period of up to 20 years (G.L. C.44, s.7) without incurring the additional administrative costs of a separate borrowing. From an "equity" perspective, a facility such as a transfer station, which has a long useful life, should be financed by long term debt because the cost of the facility is paid over the time period during which users will benefit from it.

The equity concern notwithstanding, alternatively, a municipality could use shorter-term financing approaches which result in lower interest and lower administrative costs. One such approach is to issue so-called state house serial notes. State House serial notes are actually short-term bonds, with maturities generally ranging from one to five years, which are issued through the State Bureau of Accounts. The Director of the Bureau certifies the notes; their legality is based upon an overall legal opinion from the Attorney General's Office. These serial notes, which the Bureau of Accounts usually limits to $500,000, are purchased generally by local banks. However, with the addition of a small disclosure document and a registrar and transfer agent, these notes can be marketed to individual

investors at lower rates. The interest cost of a 5-year state house serial note for a $300,000 solid waste transfer station, assuming a 6.5% interest rate, would be $58,500. A major advantage of state house notes as compared to bonds is lower administrative costs to the issuer because there is no requirement for a preliminary legal opinion, a bond rating, advertisement of a bond sale or a formal bond prospectus. Local officials should consult with their financial advisor to determine the feasibility of issuing state house notes for a transfer station.

A shorter-term debt financing approach would be to issue Bond Anticipation Notes (BANs) to finance construction costs. BANs can be issued for a one-year term, and subsequently renewed for an additional year if desired. BANs allow a municipality to spread the cost of a transfer station out over a two-year period. Because the notes have a short maturity, the interest cost is minimal. For example, for a $300,000 transfer station, a community could issue a 1-year BAN, retire $150,000 of it from current revenues or reserves, and renew the remaining $150,000 for another year after which it is retired from current revenues. Instead of retiring the BAN with bond proceeds, as is typically the case, the BAN is retired from current revenues. The total interest cost, assuming an average interest cost of 5%, would be $22,500.

Debt financing, as compared to current revenue financing, involves a tradeoff. Debt financing requires that a community pay interest as well as incur the adminstrative costs of issuance. A financial advisor should be consulted in evaluating the feasibility of issuing debt, along with the community's Treasurer who is the resident expert on debt financing.

3. Regional Approaches

Another public financing approach is for two or more municipalities to join together to form a solid waste disposal district. The district could have one or more transfer stations located within it, which would be jointly financed by and meet the disposal needs of the district's member communities. The authorization for communities to form a solid waste disposal district is contained in Chapter 40, sections 44A-44K. A district could finance the construction of the facility, and the operating and construction debt service costs would be paid from assessments paid by the member communities and tipping fee revenue from other users of the facility. An advantage of forming a district would be to spread the financing and operating costs of the transfer station across a number of users. The revenue from tipping fees paid by nonmembers would reduce the cost to the members. Communities wishing to use this approach, but finding Chapter 40 too restrictive, could seek special legislation to enable them to establish a structure consistent with their needs. Services of bond counsel and a financial advisor should be used in evaluating and implementing this approach.

4. Budgetary Consideration

Communities with budgetary problems may wish to consider an override or exclusion from Proposition 2 1/2 limits as part of their plan to finance and operate a solid waste transfer station. Communities financing the cost of a transfer facility over one or even two years may find that Proposition 2 1/2 limits their ability to pay for the facility while also meeting their other budget needs. Also, since a transfer station might not be able to accept all forms of waste, a municipality may have to continue operating its own landfill on a reduced basis while at the same time incurring the additional cost of financing and operating a transfer station. Such communities can override the 2 1/2% limit on annual increases in the tax levy so that its budget can be increased to accommodate the additional cost of the facility. A community can increase its tax levy by an additional 2 1/2% by majority vote, or by a larger amount, by a 2/3 vote -- provided however that the levy does not exceed 2 1/2% of full and fair cash value.

Alternatively, if a community is financing its transfer facility by issuing BANs, bonds or state house notes, a debt exemption could be used to lessen the impact of the additional debt service. A municipality, by referendum, can vote, to exempt debt service payments from the limitations of Proposition 2 1/2. A 2/3 vote of a City Council or Board of Selectmen is needed to put a debt exclusion referendum on the ballot; a majority vote of the electorate is required for passage.

A well organized effort, with the support of local officials, is usually needed to achieve successful referendum votes. Experience with local Proposition 2 1/2 override and debt exclusion referenda has shown that voters have to be educated about the need for the facility being financed and the need for the referendum vote to enable the municipality to afford it.

B. PRIVATE FINANCING APPROACHES

Public financing approaches usually require a municipality to retain an engineering firm and a contractor to design and build the facility. This in turn requires them to go through a cumbersome public bidding process for construction and design, as well as the process of obtaining the necessary permits. Municipalities can expedite and simplify the entire process by contracting with a full service company. Several full service firms operating in Massachusetts design, build, finance, own and operate solid waste transfer stations under contract with a municipality. Municipalities using this approach should do sufficient research to ensure that they are dealing with a reputable firm. In certain cases, contracts for the disposal of solid waste must be approved by the Emergency Finance Board, as provided in Chapter 40, section 4.

1. Full Service Contracts

Typically, a contract with a full service firm to design, build and operate a transfer station would include provisions relating to:

- o a maximum and minimum commitment for a specified amount of waste which the municipality is required to deliver each year to the transfer station;
- o a prohibition against the municipality's delivering its waste to other facilities;
- o a definition of acceptable and nonacceptable waste;
- o removal of the waste from the transfer station;
- o lease or purchase of land from the municipality;
- o limitations by the municipality on facility operation -- e.g. amount and direction of truck traffic to or from the facility, and operating hours for the facility;
- o the tipping fee for the first year of operation, and a mechanism for adjusting the tipping fee each year based on changes in operating costs; and
- o the use of the facility by users other than the municipality.

2. Tipping Fee

The tipping fee is a critical component of the contract since it defines the community's current and future financial commitment, and establishes a basis which allows a community to evaluate the financial feasibility of financing alternatives.

The typical components of the tipping fee usually include:

- o transportation of waste from the transfer station to a landfill or disposal facility;
- o annual labor costs;
- o insurance;
- o equipment maintenance, repair and acquisition cost;
- o disposal costs at the landfill; and
- o transfer station debt service.

Transportation, labor and equipment costs are typically adjusted upward each year based on changes in a cost base -- the consumer price index, for example.

3. Evaluation of Private Financing Approaches

There are certain advantages to be gained from dealing with a full service company. First, it frees local officials from the procedural requirements of hiring an engineer and contractor and the time requirements of design and construction. These requirements can be met by a private firm whose experience in building similar facilities may enable it to build a facility at a lower cost than can a municipality. Private operation also relieves the municipality of concerns about staffing the facility, maintenance and repair of equipment, insurance etc. Experienced private firms may be able to operate and maintain the facility more cheaply and efficiently than can a municipality.

In evaluating the feasibility of using a full service firm, a municipality will have to balance these consideration against the financing costs and labor costs that it pays through the tipping fees. Because full service companies are anxious to secure a guaranteed source of waste as fuel for their resource recovery plants, they have an incentive to make private financing and operation economical for a municipality. The potential loss of control of a municipality over the operation of the facility can be overcome by appropriate provisions in the service contract.

A municipality might be able to lower its disposal costs by associating with a large disposal facility and "hosting" a regional transfer station facility. The need for the disposal facility to obtain a source of waste as well as obtain a site for the transfer station could be translated into a tipping fee that is very advantageous for the municipality.

Local officials should be aware of several factors in evaluating the feasibility of using a full service firm. First, the financing cost that a municipality pays to a private firm through the tipping fees may be greater than if it issued debt on its own, since the municipality could borrow at tax exempt rates, secured by its full faith and credit. Alternatively a municipality could finance a facility from current revenue, and thereby avoid financing costs altogether. The differential in financing costs, however, also depends on whether the private vendor is using bank financing or tax exempt industrial revenue bond financing, which may be eliminated or sharply curtailed in the near future due to pending tax legislation.

Second, under a so-called "put or pay" contract, the municipality is obligated to deliver at least the specified minimum annual amount of waste. If its fails to do so, it is nevertheless obligated to pay the tipping fees applicable to the minimum amount. Thus a municipality contemplating entering into such an agreement should make certain that it can meet the minimum waste requirement over the life of the contract. Some municipalities may wish to enact a waste control ordinance or by-law which would ensure that the waste collected in the municipality is delivered to the transfer station. If so, they should consult with legal counsel about their ability to do so under the home rule provisions of the Massachusetts constitution and the applicability of the Federal antitrust laws.

The full service approach is most appropriate for a municipality that needs a completely new facility. Another approach for a community which has a facility already is to enter into a service contract with a private vendor to operate the facility.

CONCLUSION

The foregoing descriptions of financing alternatives illustrate the wide variety of approaches available to local officials. The choice of alternatives should reflect financial

and economic analysis, political and legal considerations and geographic factors. Communities should seek professional assistance in evaluating the various alternatives. A financial advisor can assist in evaluating the cost and financial feasibility of the various financing options. The revenue-producing nature of these facilities present a range of opportunities for reducing the net cost of these facilities to the taxpayer and should be part of the evaluation of financial feasibility. Assistance of legal counsel is necessary if a community is considering forming a regional district or is considering contracting with a private firm to build and/or operate the facility. The potential impact of pending tax law changes on the financing alternatives make it even more imperative that a municipality use a financial and legal advisor.

Transfer Station Charts

Compiled by Manuel Alcantara,
Bureau of Solid Waste Disposal

The following charts list several communities in Massachusetts which use transfer stations as part of their solid waste disposal system. These charts are helpful to community in several ways. For each transfer station, they:

1. give the location and the amount of tonnage handled.
2. states who operates the transfer station.
3. lists the types of vehicles allowed at the transfer station.
4. gives the method of operation of the transfer station.

These charts do not contain all of the transfer stations in Massachusetts; however, they do cover wide range of sizes.

KEY:

Tonnage Handled:	Tonnage handled by transfer station in one year
Operator:	First name is responsible local unit; second is commercial operator, if applicable
Vehicle Restriction:	Types of vehicles allowed to use the transfer station
	Small: cars and small pick-ups only
	Large: packer trucks, trailers, large pick-up only
	None: all vehicles allowed
Compaction:	Type of compaction used, if any
	Trailer: Trailer or bin has self-contained compaction
	Stationary: Transfer station has compactor(s) built in
	None: No compaction
Tipping:	Method of refuse handling
	Tipping Floor: Users dump refuse on tipping floor; refuse is then loaded into trailers or bins by front-end loader
	Direct: Users dump refuse directly into the trailer or bin

SOUTHEAST REGION TRANSFER STATION

CITY/TOWN	TONNAGE HANDLED	OPERATOR	VEHICLE RESTRICTION	COMPACTION	TIPPING
Berkley	1,300	GSX/DPW	SMALL	Trailer	Direct
Duxbury	7,478	Board of Selectmen	NONE	Trailer	Tipping Floor
Franklin	N/A	Blackstone Disposal Service/DPW	NONE	Trailer	Tipping Floor
Hanover	7,540	Town/BOH	NONE	Trailer	Tipping Floor
Hanson	N/A	McDonald Brothers Inc./ Town/BOH	SMALL	Trailer	Direct
Marion	1,040	Town/DPW	SMALL	Trailer	Direct
Plymouth	8,350	Town/DPW	NONE	Trailer	Tipping Floor
Plymouth	37,350	Town/DPW	NONE	Trailer	Tipping Floor
Plympton	1,027	McDonald Brothers Inc./ DPW	NONE	Trailer	Direct
Somerset	1,200	Town Highway Dept.	SMALL	NONE	Direct
Stoughton	10,097	Town/DPW	NONE	Trailer	Tipping Floor
West Bridgewater	3,420	GSX/Highway Dept.	NONE	NONE	Tipping Floor

CENTRAL REGION TRANSFER STATION

CITY/TOWN	TONNAGE HANDLED	COMMERCIAL	VEHICLE RESTRICTION	COMPACTION	TIPPING
Acton	10,800	Town/DPW	NONE	None	Tipping Floor
Berlin	1,412	Truck-away Inc. BOH	SMALL	Trailer	Direct
Harvard	2,080	Town-away Inc. BOH	SMALL	Trailer	Direct
Leominster	N/A	Refuse Fuel/DPW	NONE	NONE	Tipping Floor
Marlboro	?	Wright Brothers Inc./BOH	NONE	NONE	Tipping Floor
Milford	?	Blackstone Disposal Services/DPW	NONE	NONE	Direct
Petersham	260	Town/BOH	SMALL	NONE	Direct
Millbury	96,000	Millbury/Resco DPW	LARGE	NONE	Tipping Floor
Southboro	4,800	Town/DPW	SMALL	Trailer	Direct
Upton	N/A	?	SMALL	NONE	Direct
Westboro	T.S. (unde constructi	E.L. Harvey & Sons Inc./DPW	NONE	NONE	Tipping Floor

NORTHEAST REGION TRANSFER STATION

CITY/TOWN	TONNAGE HANDLED	OPERATOR	VEHICLE RESTRICTION	COMPACTION	TIPPING
Belmont	?	BFI/Town	SMALL		
Boston	264,000	GSX/DPW	LARGE	Trailer	Tipping Floor
Boston	93,900	Jet-A-Way Inc. DPW	LARGE	NONE	
Cambridge	N/A	BFI/DPW	LARGE	Trailer	Tipping Floor
Carlisle	2,250	DPW/Town	SMALL	Trailer	Tipping Floor
Dedham	N/A	Rubbish Disposal DPW	NONE	Trailer	Tipping Floor
Danvers	68,125	Refuse Fuel Assc. DPW	NONE	Stationary	Tipping Floor
Essex	1,955	Refuse Fuel Assc. DPW	LARGE	Trailer	Direct
Ipswich	5,263	Robert C. Hilt Inc./Town	NONE	NONE	Tipping Floor
Lawrence	47,780	Refuse Fuel/DPW	NONE	NONE	Tipping Floor
Marblehead	16,000	Town/BOH	SMALL	Trailer	Direct
Needham	20,000	Town Highway Dept.	SMALL	NONE	Direct
Newton	88,780	GSX/Dept. of Public Works	NONE	Trailer	Direct

WESTERN REGION TRANSFER STATION

CITY/TOWN	TONNAGE HANDLED	OPERATOR	VEHICLE RESTRICTION	COMPACTION	TIPPING
Alford	128	Commercial Disp. Co./DPW	SMALL	NONE	Direct
Ashfield	424	CVS. Conn. Valley Sanitary Inc/Board of Selectmen	SMALL	Trailer	Tipping Floor
Becket	1,352	Commercial Disp. Town Highway Dept.	NONE	Trailer	Direct
Chesire	2,400	Commercial Disp./ BOH	NONE	Trailer	Direct
	N/A	Caldwood Enter Inc.	SMALL	Trailer	Direct
Chesterfiel	128	Berkshire Cleanway Inc./ Board of Selectmen	SMALL	Trailer	Direct
Conway	750	Commercial Disposal/BOH	SMALL	Trailer	Direct
Cummington	750	Calwood/BOH	SMALL	Trailer	Direct
Dalton	1,125	Berkshire Cleanway/Town	SMALL	Trailer	Direct
Florida	620	Environmental Action/Town	SMALL	Trailer	Direct
	N/A	T.G.Welch Disposal	SMALL	Trailer	Direct
Hadley	3,224	Calwood Enter Inc.	NONE	Trailer	Direct
Hancock	1,100	Environmental Action/BOH	SMALL	Trailer	Direct

Hatfield	N/A	Calwood Inter Inc./ Highway Department	NONE	Trailer	Direct
Hinsdale	1,100	Environmental Action/Town	SMALL	Trailer	Direct
Huntington	1,080	Commercial Disposal Inc.	SMALL	Trailer	Direct
Middlefield	330	Cleanway Disposal Inc. Town	SMALL	Trailer	Direct
Mt. Washing	55	Commercial Disposal Inc.	SMALL	Trailer	Direct
New Marlbor	590	Berkshire Cleanway Inc./	NONE	Trailer	Direct
New Salem	N/A	Town Highway Department BOH	NONE	NONE	Direct
Northfield	N/A	Russel Hudson/ BOH	NONE	Trailer	Direct
Otis	531	Lenox Trucking BOH	SMALL	Trailer	Direct
Peru	672	Berkshire Cleanway Inc./ Board of Selectmen	SMALL	Trailer	Direct
Plainfield	265	Calwood Enter. Inc/Board of Selectmen	SMALL	Trailer	Direct
Southwick	4,295	T.G.Welch Inc. Town	NONE	Trailer	Direct
Stockbridge	N/A	Berkshire Cleanway	SMALL	Trailer	Direct

Tolland	N/A	Berkshire Cleanway	N/A	N/A	N/A
Rowe	285	Berkshre Cleanway Inc./ Board of Selectmen	SMALL	Trailer	Direct
Sandisfield	315	Berkshire Cleanway Inc.	SMALL	Trailer	Direct
Sheffield	N/A	Berkshire Cleanway Inc./ BOH	N/A	N/A	N/A
Tyringham	238	Daley& Sons/Board of Selectmen	SMALL	Trailer	Direct
Wales	N/A	N/A	N/A	N/A	N/A
Washington	N/A	Berkshire Cleanway Inc. Town	SMALL	Trailer	Direct
Wendell	N/A	Commercial Disposal Inc.	N/A	N/A	N/A
Westring		Commercial Disposal Inc./ BOH	NONE	Trailer	Tipping Floor
West Stockbridge	1,097	Berkshire Cleanway Inc./ BOH	SMALL	Trailer	Direct
Whately	1,050	Calwood Inter. Inc.	SMALL	Trailer	Direct
Wilbraham	2,704	Calwood Inter. Town-BOH	SMALL	Trailer	Direct
Worthington	550	Calwood Inter. Inc./BOH	SMALL	Trailer	Direct
Russel	N/A	Commercial Disposal	NONE	Trailer	Direct

Appendix One: Size Determination and Haul Costs

By John H. McMichael
Senior Planner,
Bureau of Solid Waste Disposal

Transfer station size and the costs for transfer hauling waste to the final disposal site are both important factors in evaluating a transfer station proposal. This article briefly examines aspects of determining these variables.

Communities vary widely in the way they dispose of their solid waste. In some communities, municipal crews or private haulers collect residents' trash and take it to the transfer station. In others, residents are responsible for bringing their waste to the transfer station, which may also be used by commerical haulers serving local businesses. Transfer stations vary widely in the size and type of operation. It is impossible to determine this merely by using a community's population. There are two factors which should be considered:

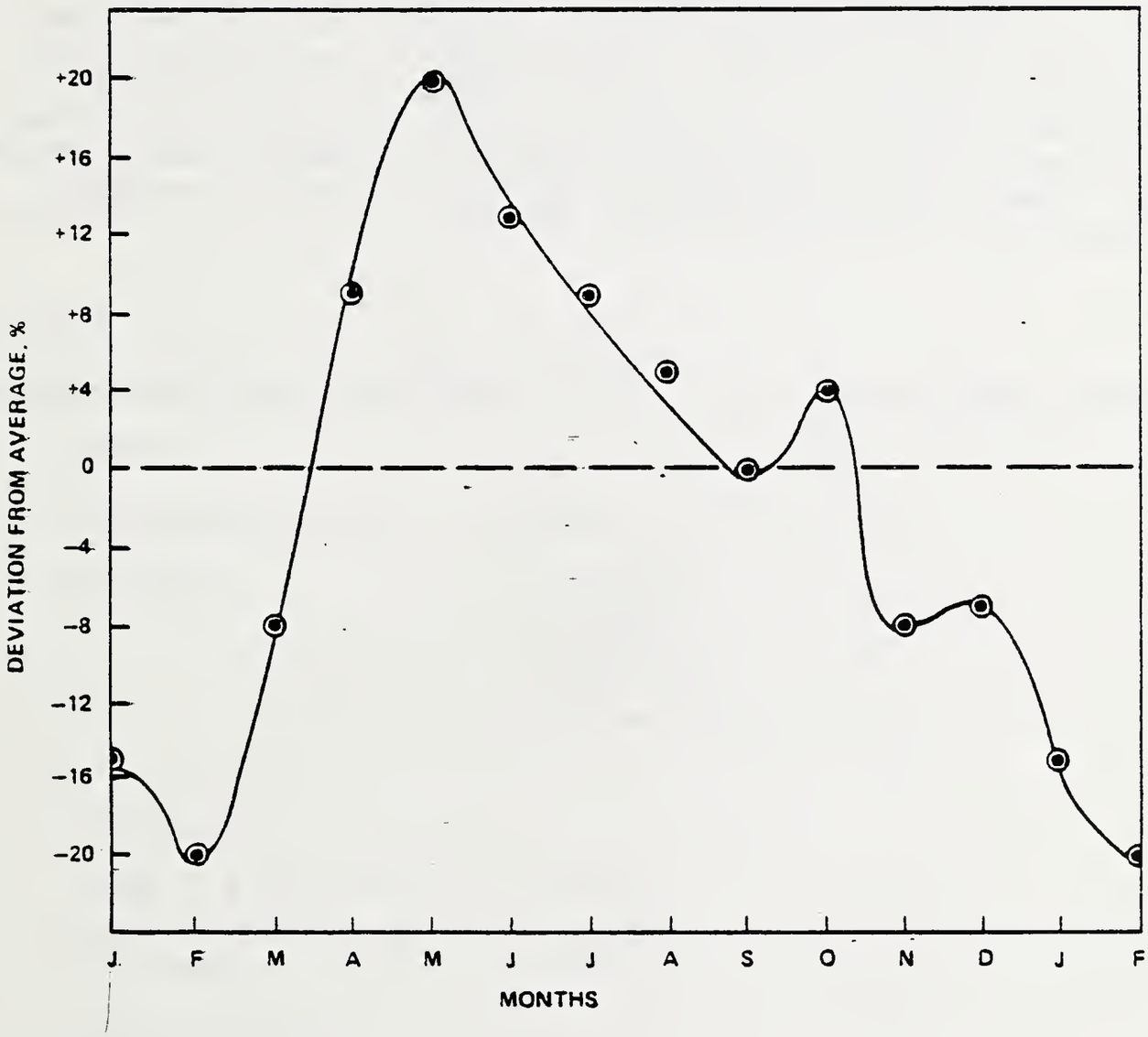
--Traffic requirements. This is dependent upon a community's solid waste collection system. If a community picks up its residents' waste at the curbside, then there will be much less traffic at the transfer station than if residents are expected to bring their own waste to the transfer station themselves. A small transfer station to which residents bring their trash may have just as high a traffic count as a much larger facility which accepts waste only from standard collection vehicles. The relatively small proposed Holden transfer station will accommodate between 250 and 1250 vehicles per day, most of which are residents' cars. On the other hand, the Millbury transfer station will accept a much larger amount of waste from a smaller number of large commercial collection trucks.

--Seasonal variations. Studies have shown that the amount of waste a community generates per day may vary widely. On Martha's Vineyard, communities generate about ten times more waste in the summer than they do in the winter.

The seasonal variation question is complicated when one considers transfer stations which accept both municipal and commercial waste. In Worcester, for example, a weighing program at the landfill found that while residential waste generation was fairly constant, the amounts of commercial waste varied greatly.

The table on the following page illustrates an example of seasonal variation in waste generation. It is taken from a study done by the Mitre Corporation on waste generation patterns in central Massachusetts. As the table shows, the study found a variation of 40 percent between February and May.

The important question of sizing cannot be answered simply. One basic rule of thumb, however, is that most communities generate between .8 and 1 ton per resident per year, including commercial, industrial, and residential waste.



Source: Based on industry data adjusted for the Central Massachusetts Resource Recovery Project.

Figure 3.5-1. Estimated Seasonal Waste Fluctuation

Hauling costs are also highly variable. Among the factors which should be considered in determining hauling costs are:

--Hauling distance to final disposal site.
--Road conditions.
--Type of transfer truck used.
--Condition of transfer trucks and maintenance requirements.
--Amount and composition of waste hauled.
--Labor costs.

The following page illustrates an example of haul cost estimates, taken from a study done by Metcalf and Eddy for the Bureau of Solid Waste Disposal. At the top of the sheet are the various costs incurred in hauling waste from Falmouth to the proposed SEMASS facility in Rochester, a 46 mile round trip. The lower section displays Falmouth's costs on an annual basis. At the right side are spaces which can be used to make a similar calculation for other communities.

Haul Cost Estimation Sheet

Haul cost have been determined by assuming:

Item	Cost
Labor (tractor drivers)	$25,000/yr.
Fuel consumption	4 miles per gallon.
Oil, lube, maintenance	$3/hr. of operation
Tire replacement	tires replaced every 35,000 miles
Unit tire cost	$500 per tire
Insurance	$1,500/yr. per tractor
Trip speed	30 miles per hour.

For example:

Haul cost from Falmouth to SEMASS in 1985		Your Community Estimate Item	Cost
Given:			
Haul miles per year	49,091	_____	_____
Equipment	2 tractors	_____	_____
	(10 tires) each	_____	_____
	3 trailers (8 tires each)	_____	_____
Haul Cost:			
Labor, 2 @ $25,000/yr =	$50,000	_____	_____
Fuel, $\frac{49,091}{4}$ x $1.30 =	$16,000	_____	_____
Oil, lube, maint., $\frac{49,091}{30}$ x $3/hr =	$4,900	_____	_____
Tires, $[(\frac{49,091 \times 10}{2} + \frac{49,091 \times 8}{3})/35,000] \times \$500$ =	$ 5,400	_____	_____
Insurance, 2x$1,500 =	$ 3,000	_____	_____
Total	$79,300 $/yr		_____
Unit Haul Cost	1.62/mile		_____

Falmouth to Semass is 46 miles roundtrip